ARCH 4, 1937 FIRST AERO WEEKLY IN THE WORLD REGD. AT THE G.P.O. AS A NEWSPAPER

MAR 18 1937

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

SIXPENCE EVERY THURSDAY

PALMER

Tyre Limited

BLENHEIM BOMBER

THE BRISTOL AEROPLANE CO., LTD., FILTON, BRISTOL

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (50 lines).

HERTFORD ST., COVENTRY. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.

GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2. Telegrams: Autopress, Birmingham. Telephone: Midland 2971.

260, DEANSGATE, MANCHESTER, 3. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.

26B, RENFIELD ST., GLASGOW, C.2. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 13 0, 6 months, 16s. 6d. 3 months, 8s. 6d. Other Countries: Year, £1 16 0. 6 months, 18s. 0d. 3 months, 9s. 0d.

No. 1471. Vol. XXXI. MARCH 4, 1937. Thursdays, Price 6d.

Good Work Well Done

THE appointment of a new Chief of the Air Staff is always an event in the defence history of the country. At the present juncture the officer holding the highest position in the Royal Air Force is actually one of the most important men in the world, for all the world is watching the growth of that Force as one of the greatest guarantees that war shall not break out in Western Europe. The Russian writer on strategy, General Golovine, in his book, *Air Strategy*, gives it as his opinion that when Britain is strong in the air neither France nor Germany dare attack the other, for the intervention of Britain would mean the inevitable defeat of the aggressor. Once the British Cabinet has decided that the R.A.F. shall be strong, it rests with the Chief of the Air Staff to see that the decision is carried into effect. Unless the C.A.S. is an officer of first-rate ability the R.A.F. is not certain to possess such formidable power as to make it clear to those of bellicose mind that aggression will not pay.

Marshal of the Royal Air Force Sir Edward Ellington has been C.A.S. since May, 1933, when he succeeded the late Sir Geoffrey Salmond. The country has been very fortunate in having such a brilliant officer in that position to deal with the large expansion programme which has recently been undertaken. Despite the concern manifested by some Members of Parliament in a recent debate because the time taken to get airframes into rapid production had been somewhat underestimated by the constructing firms, it can be said without fear of contradiction that the R.A.F. expansion has been handled in a most masterly manner and is proceeding with a smoothness and rapidity which has surprised the world. Recruiting has surpassed all expectations, and the prompt increase of the training establishments and the adaptation of the whole scheme of training to meet the needs of the new situation could hardly have been better handled. The supply of aero engines is also ahead of requirements. At the same time the organisation of the Service into a new system of Commands and Groups in place of the old system of Areas has made it better fitted to deal with any emergency which may arise. For all these innovations and improvements the chief credit must go to Sir Edward Ellington.

It is, perhaps, not generally known that all this exacting work has been carried out by the retiring C.A.S. in the face of indifferent health. One must pay a tribute to the courage which has enabled Sir Edward to bear his heavy responsibilities and carry through his fine work despite this handicap. He has, so to speak, broken the back of the expansion work, and he has attained the highest rank in his Service. It would be a normal procedure for him to seek repose at the end of such a period of strain. Sir Edward is doing no such thing. He has accepted the position of Inspector General of the Royal Air Force. It must surely be unprecedented for any officer of his rank, whether Admiral of the Fleet, Field Marshal, or Marshal of the Royal Air Force, after having been Chief of the Staff of his Service, to continue to serve in a less supreme capacity, but Sir Edward Ellington's sense of duty impels him to continue to place his high abilities at the service of his country. For this, too, he deserves great credit

The New C.A.S.

The new Chief of the Air Staff, Air Marshal Sir Cyril Newall, goes to the top of the tree over the heads of two Air Chief Marshals and of two Air Marshals who are his seniors. It is the boast of the Royal Air Force that selection for a certain post is not influenced by seniority. Sir Cyril's all-round ability and special fitness for his new post are known, in addition to which qualifications he has the advantage of having previously been Deputy Chief of the Air Staff and of having recently worked hand in glove with Sir Edward Ellington as Air Member for Supply and Organisation on the Air Council. He has thus played an important part in the work of expansion and is fully conversant with the matter. One

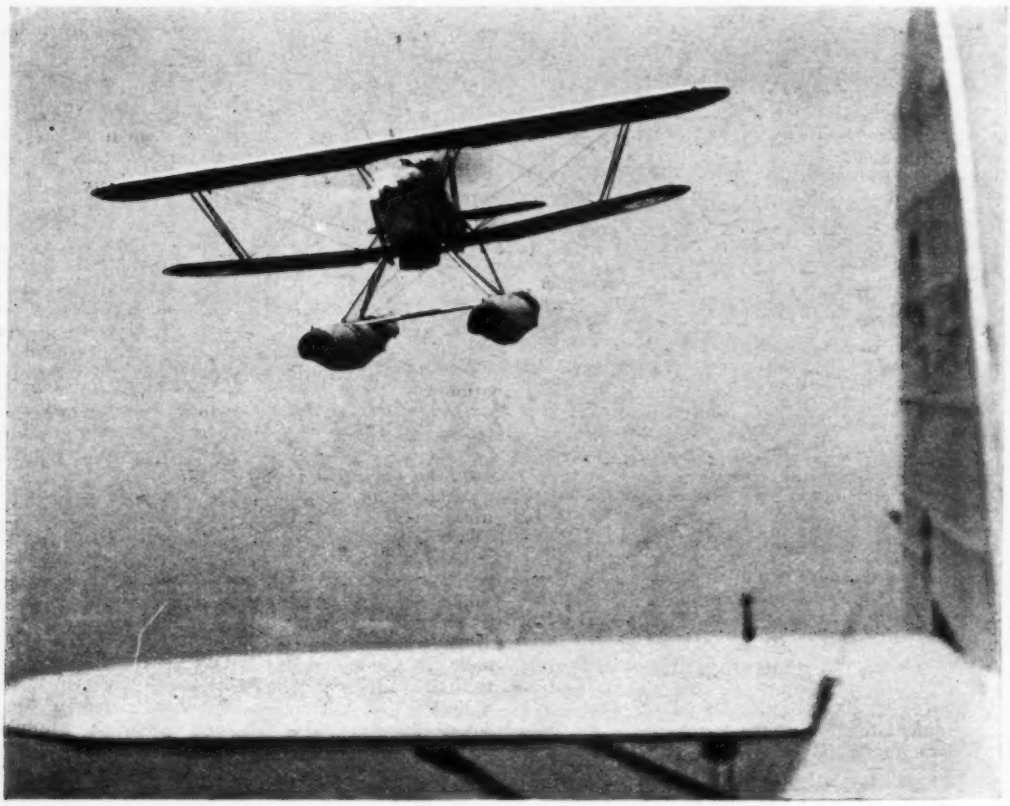
unusual feature of his selection is that he has never passed through any Staff College; but practical experience of the Air Council is worth more than being able to write *p.s.a.* after his name. There can be no doubt that the R.A.F. will continue to expand satisfactorily and to flourish under his supreme direction.

Portsmouth as Air Base

SO Portsmouth City Council has decided, though only by a majority of two, to accept the scheme for making an airport in Langstone Harbour as a terminus for the Empire air services of Imperial Airways. Nearly half the Council were opposed to the scheme, and a large meeting of citizens has protested against it on the ground that rates would be increased. One cannot help sympathising with the citizens' objection to pay more rates at a time when they are already high, but the chairman of the Docks and Airport Committee, Councillor A. Johnson, held that the sale of the present aerodrome would avert the necessity of increasing the rates, and, indeed, that there was a reasonable expectation that the rates would benefit by adoption of the scheme. It is much to be hoped that he is right, and also that in time the city of Portsmouth will profit in many ways by becoming the terminus of the greatest system of air services in the world.

Apart from the local interests of Portsmouth, the country at large and the Empire as well are to be congratulated on the prospect of having the best possible base for the services of Imperial Airways. That Portsmouth is some distance from London is of small importance to travellers who are arriving from or starting for Sydney or Durban, and a feeder line of landplanes would bring the two places still closer together. The Maybury scheme provides for connecting Portsmouth by air with all the chief cities of the kingdom, and private enterprise will probably elaborate that scheme once the Imperial Airways traffic has assumed the massive proportions which are reasonably to be expected.

Some may say that it is undesirable to have our greatest civil airport side by side with our greatest naval base, as, in the event of war, the latter would be a natural object of concentrated attention by enemy bombers. Before long we may be so dependent on air communications between parts of the Empire that serious damage to our terminal airport might be considerably more than an inconvenience. Against that it may be said that the safest place during an air raid is near to an important military target, for well-aimed bombs will hit the latter, and misses are just as likely to fall in open country as anywhere else. There is, of course, the chance that in time of war the whole of Imperial Airways' organisation would be taken over by the Air Ministry. In either case Langstone would be protected by the whole air defence system of Portsmouth, which must needs be on an elaborate and formidable scale.



FISH HAWK. A Hawker Osprey IV fleet fighter reconnaissance floatplane of the Mediterranean Cruiser Squadron in company with another of its species. The machine is the most recent version of the Osprey to go into service and is fitted with the fully supercharged 600/640 h.p. Rolls Royce Kestrel V engine.

The Outlook

A Running Commentary on Air Topics

The Missing Link?

THE problem of reducing the time now occupied in getting air passengers from the centres of towns to the aerodrome is one which, like the poor, is always with us. The most recent contributor to offer suggestions is Mr. Reginald Brie, whose very interesting article in *The Daily Telegraph* of February 25 was probably studied with interest by many of our readers. After examining and dismissing as impractical the many suggestions made from time to time for central aerodromes in or over London, Mr. Brie offers as a possible solution the placing of floating platforms on the Thames at one-mile intervals between Chiswick and Greenwich, the "feeder-line" work being done by special aircraft capable of taking off from, and landing on, platforms measuring but 60 yards in length by 15 yards in width.

It is to be noted that Mr. Brie admits that at present no suitable type of aircraft exists, although he does mention the claims of rotating-wing aircraft, "of which the autogiro is the most highly developed example."

Practical Considerations

FROM the operational point of view, there is probably no great difficulty in realising the Brie project. The platforms would not be very expensive, and the river is a very good guide, which could be followed safely by rotating-wing aircraft, even in conditions of fairly poor visibility. Recent developments in rotating-wing aircraft, which include a helicopter of very simple design about which nothing may be published for the present, have shown that take-offs and landings in quite restricted areas are quite feasible. But one may question whether the Brie scheme would be likely to save any time at all.

In the article Mr. Brie points out the sanity of the Air Navigation Regulations, which forbid flying over towns at heights which do not permit aircraft to land outside the town in case of engine failure. He also asks whether an autogiro making a forced landing in Piccadilly Circus would not cause as great risk to others as an ordinary aeroplane crashing on the housetops. To get over the difficulty, Mr. Brie advocates that the rotating-wing aircraft operating the feeder-line service should be compelled to follow the river between the limits of Chiswick and Greenwich. But in that case would not the time taken by passengers in getting from their hotels to Westminster, for example, and flying in rotating-wing aircraft from Westminster to Croydon via Chiswick or Greenwich, following all the twists and turns of the Thames, be as long as the present motor coach journey? One fears that, with slight delays in getting the passengers on board, starting the rotor, perhaps shifting the pontoon about to get it into a wind which had suddenly changed, and so forth, the few minutes that might be lopped off would scarcely make the scheme worth while.

Those Inverted Vees

A FORM of engine which seems assured of popularity in the immediate future is the air-cooled inverted-vee. Characteristically, we look like finding general employment for this type of power plant before those countries whose premature panegyrical publicising of their air-cooled vees has for so long commanded prominence in our foreign contemporaries.

Already the De Havilland Gipsy Twelve, our first, and so far, sole, representative in this category, has been specified for one civil and one military production aircraft—the D.H. Albatross long-range transport and Don advanced trainer—whereas, so far as we can gather, no production orders have yet been received by Salmson, Walter, Renault or Fairchild, the foreign protagonists of this type of engine.

Pros and Cons

MR. FEDDEN, in his recent classical paper, elucidated to a certain extent the merits and (rather more fully!) the shortcomings of the inverted-vee unit. He chose the Walter Sagitta as a typical example of such a Continental engine, emphasising the "abnormal wetted surface" of this type. Here he did some overdue debunking, for some of the inverted-vee enthusiasts have been unduly gushing in their claims of small frontal area. As we write our eye catches a diagram in a Fairchild catalogue projecting a 420 h.p. inverted-vee engine against the silhouette of a radial of equivalent power. (How it *does* resemble those engines in the Monospar Croydon!) The frontal area figures are respectively 5.16 sq. ft. and 13 sq. ft. Further research reveals that the Fairchild is 61in. long, and the silhouetted sunflower in the background 42in.

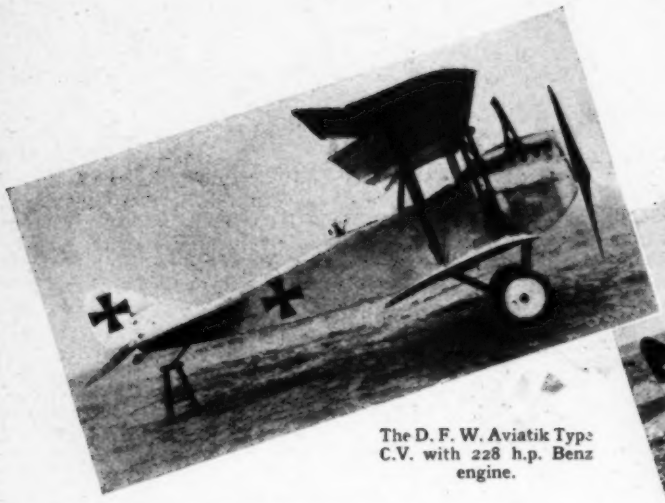
Undoubtedly there is plenty to be recorded for the inverted vee on the debit side, but after all, the Kestrels have done very well for themselves; so why not stand something similar on its head and cool it by air?

Air Raid Precautions

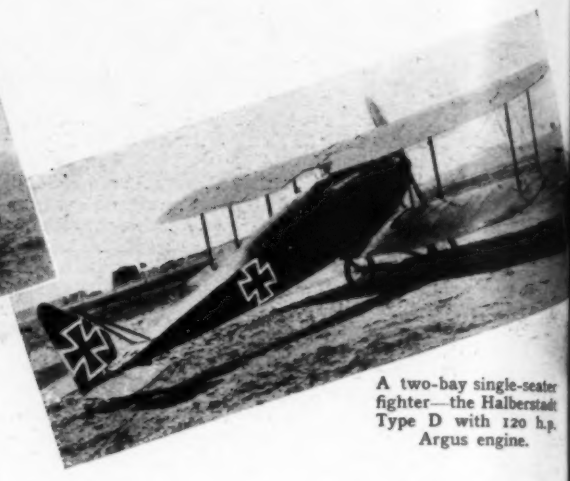
IT is extremely annoying and expensive when one cannot take the word of a civilised nation solemnly signed on a scrap of paper as having any binding force. In the olden days, when European nations and others were mostly ruled by dynastic kings, a word of honour usually meant a good deal, for the honour of the individual as well as of the nation was at stake. We have, of course, progressed since then, and though most of the important nations have signed a gas convention at Geneva, we cannot accept that by itself as providing sufficient protection for the citizens of London and other British cities. Normally, even modern democracies will find that it pays in the long run to keep their promises, but as normality is not always a characteristic of a nation at war we have to take precautions in case the promise should be broken.

Our best guarantee is powerful armaments, and, secondly, steps have to be taken to protect the people from the effects of possible bombing. So the expense of thousands of volunteer firemen and many thousands of gas masks has to be faced. It is well that the authorities are making their preparations in good time, for air raids make far less effect on a population which can protect itself than on one taken by surprise. Of course, the idea of destroying London in one night is absurd. Panic is the great thing to avoid, and, fortunately, phlegmatic Britons are less likely than most to give way to panic. One cannot even imagine Britain being forced to surrender by blows at her nerve centres; but none the less it is wise to take steps to minimise the possible effect of such attempts.

DIARY of FORTHCOMING EVENTS—PAGE 204



The D. F. W. Aviatik Type C.V. with 228 h.p. Benz engine.



A two-bay single-seater fighter—the Halberstadt Type D with 120 h.p. Argus engine.

OUT OF THE PAST: Illustrated on this page are six famous German war-time types most of which, as Capt. Macmillan relates, are preserved in the Berlin Air Museum.

IN SEARCH OF GERMAN AND ITALIAN AVIATI PART

NOW —an

Capt. Norman Macmillan, in the Fou ticle
facture of Engines for the German rce
Museum, Renews His Acquaintance w uton

PRIOR to the advent of Herr Hitler's Government four years ago, aero engines built in Germany were of two kinds—fairly high horse power types for use in airliners and airships, and relatively low-power types for use in sport and training aircraft.

Apart from airships the market for the higher-powered types was limited to the needs of the Deutsche Luft Hansa and whatever foreign sales could be effected in the face of world competition. Sometimes foreign purchasers of German aircraft stipulated their equipment with foreign engines, often of British or American manufacture.

For example, about 1932 the Portuguese Government purchased Junkers aircraft powered with British Siddeley engines. These machines were military seaplanes for use in the Portuguese Naval Air Service. They were made in the Junkers factory in Sweden, for at that time Germany did not build military aircraft within her own frontiers.

Thus there were many reasons, prior to 1933, why the aero-engine manufacturing industry in Germany was restricted, especially in the higher-powered types.

Expansion Begins

The decision to create the German Air Force with the utmost rapidity completely altered that situation.

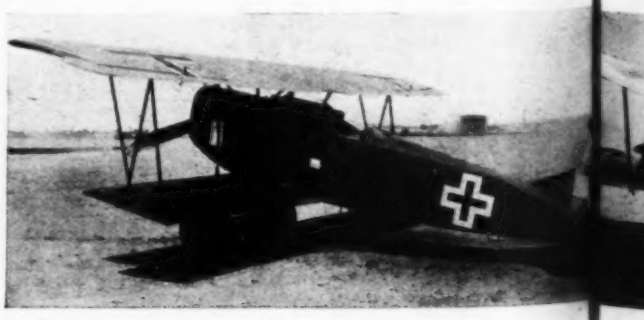
But the position of aero-engine manufacturers was then less favourable than that of airframe manufacturers. The latter had constructed very efficient civil aircraft that were suitable for immediate transformation into military aircraft with only minor alterations. Typical examples were the Junkers Ju.52 airliner, which became the standard heavy bomber, and the Heinkel He.70 high-speed mail-carrier, which became a bomber-reconnaissance aircraft. As military aircraft both were instantly superior in performance to equivalent British military types. Indeed, it would be more correct to say that there were no equivalent British types in the Royal Air Force at that time.

But in the engine field the position was different. German manufacturers had had no experience in the design and construction of supercharged types. These were forbidden by the Versailles Treaty. Thus German designers were handicapped in the swift production of military engines able to give their maximum power at heights of 12,000 to 15,000 feet. No doubt this factor contributed to the placing of orders for a number of Siddeley and Rolls-Royce engines soon after the creation of the Third Reich.

Yet recently, when I visited the Daimler-Benz factory at Marienfelde, in the suburbs of Berlin, it was producing supercharged engines. More than that, although it was working to full capacity during the day, night shifts were not employed—which seems to indicate that engine output in Germany has now caught up airframe production.

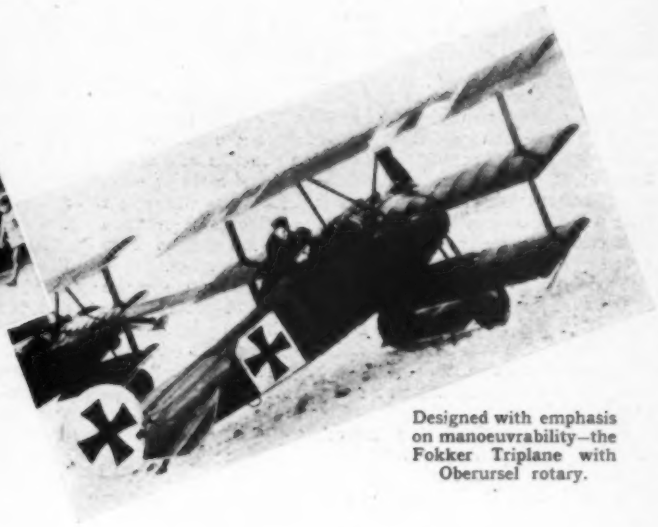
This factory is of modern layout. It comprises two main and two subsidiary portions. The latter are the administrative buildings and the engine test plant, the former the machine shop and the assembly shop.

The general internal organisation and layout of an aero-engine factory are much the same the world over. But at Daimler-Benz the external arrangement is different from that in most factories. Building units are separated one from another in order to reduce their vulnerability to air attack. Enlargement of the factory has, however, reduced the clearance between the buildings to some extent since the factory was first planned. Thus, the initial purchase of sufficient land is clearly an important factor to watch when planning new factories intended to give the



The Fokker D VII, perhaps the most successful of all the German fighters. It mounted a 160 h.p. Mercedes.

A typical Gotha bomber with a pair of 260 h.p. Mercedes engines operating as pushers.



Designed with emphasis on manoeuvrability—the Fokker Triplane with Oberursel rotary.

PART IV

V —and THEN

the Fourth Article of this Series, Describes the Manufacture of German Aircraft To-day, then, in Berlin's Air Ministance with Photographs of Historic Military Aircraft of 1914-1918

maximum security in the face of possible air attack.

Underneath each shop of the Daimler-Benz plant are bomb-proof and gas-proof shelters for the workers. Easy entry to them is assured by wide, sloping runways down which the maximum number of men can move rapidly without confusion.

The German manufacturer appears to have decided that it is easier to rebuild a factory and re-equip with new machinery than it is to find, and train, skilled workers. Thus it is that in these German factories provision is made to protect the lives of employees in the event of air attack. This factor must certainly play a part in determining output capacity in war. Our own manufacturers (and our Air Ministry and Treasury) ought to take a lesson from their opposite numbers in Germany, for most factories in the British aircraft industry are geographically far more vulnerable to air attack than those I saw in Germany.

Turning now to the interior of the factory, only one type of engine was in production. The machine shop contained the same orderly lines of machine-tools that one finds in any factory of the kind. The raw materials fed in at one end of the long transverse lines of machines and at the other end completed parts flowed out to inspection departments housed in rooms along the side of the building. Organisation was good in this shop, but I saw no reason to estimate it to be materially better or particularly different from similar shops in British factories. In fact, it could quite well have been a British firm.

Among parts coming through I inspected crankcases, cylinder blocks, connecting rods, crankshafts, and numerous small details. Workmanship was of the order one would naturally associate with a company having the reputation of Daimler-Benz.

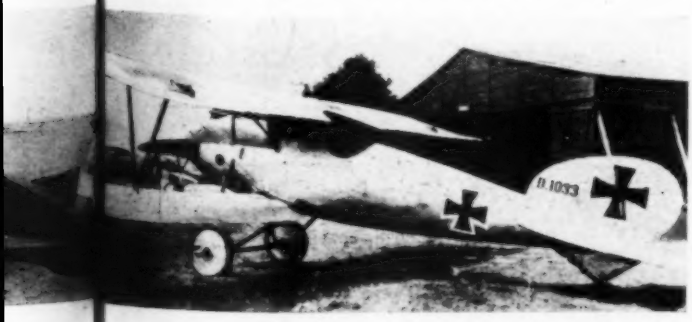
At the far end of the shop are the physical and chemical laboratories responsible for checking the quality of the materials fed into the machines. The methods of testing employed are the standard methods the world over.

A short walk brought us to the assembly shop. There, in a sub-department, the moving parts of the engine were being polished by soft rotary buffs. From this department connecting rods, crankshafts and supercharger rotors emerged smooth and shining as though plated with chromium. The utmost care was taken to secure the high degree of polish required.

Assembly Methods

Accompanied by an Air Ministry technical official and a representative of the company, I passed along the preliminary assembly lines. The connecting rod assembly was especially interesting. The big end was mounted on a quadruple roller bearing. The housing for the rollers, made in two halves, formed a unit when enclosed within the connecting rod and its bearing cap. To provide a perfect fit each half-member of the roller housing was serrated; the serrations of each half fitted so that the assembled bearing was equal to a solid bearing. The infinitely greater ease of assembling this type of bearing was a remarkable time-saver in man-hours. This specialised bearing assembly was developed by the German Argus Company; Daimler-Benz employ it under licence.

We passed on, watching process after process (including carburettor assembly), until we turned into the engine-assembly line, where, in two rows of twenty, units were growing from parts into complete engines about crankcases mounted on assembly jigs that ran on rails. Detail parts were fed sideways into the assembly line. As the engines developed into the finished state I saw that they were big vee-twelve-cylinder, inverted, liquid-cooled



The successful Albatros D 3 fighter with 175 h.p. Mercedes. Note the modernity of line.

engines of military type, supercharged, of Daimler-Benz design. Powered with two of these engines the German medium-heavy bombers (like the Heinkel He.111) have a speed of 250 m.p.h.

Thence we went out to the test plant. In one of the hangars an engine was undergoing its standard ten-hours' test. In a small room, that looked rather like the cockpit of a large aeroplane minus the flying controls and seats, instruments were mounted on either side of a single pane of glass through which the testers could observe the engine that was running in the hangar. The readings of pressure and temperature, fuel and oil consumption gauges were noted at regular minute intervals in the engine log.

I passed out into the open hangar and moved along the gangway. The noise from the open exhaust ports of the big engine was deafening, the blast of air like a hurricane. Yet outside the test shop the noise was negligible, for the silencing arrangements of the test plant were good. I understood that there were no complaints about noise from the local residents.

After its standard ten hours' test each engine is stripped, washed in cleaning baths, and thoroughly examined. Then it is reassembled and, without further running, despatched to the airframe manufacturers as a power unit for the aircraft that flow in a steady stream from the aeroplane factories of the Third Reich.

The German Air Museum

After a talk over some morning sandwiches and coffee, my guide from the Air Ministry and I left the Daimler-Benz factory and went on to the Air Museum of Berlin. The Deutsches Luftfahrtmuseum in the Invalidenstrasse was made possible by the order of General Göring. But the credit for the collection of the exhibits must go to Captain Krupp, who for many years has specialised in the collection of suitable material.

Captain Krupp has charge of this museum, which is well worth a visit from the British visitor to Berlin. It is of especial interest to that large band of war-time pilots of the Royal Naval Air Service and the Royal Flying Corps who fought against the German Flying Corps during the Great War, for specimens of every type of war-time aircraft against which they fought (except seaplanes) are shown.

The exhibits are, however, not confined to military aeroplanes. Both pre-war and post-war aircraft are included in this historical exhibition of German aviation. Among them are fragile machines that flew in the first decade of the present century. Nineteenth-century aviation is represented by the gliders of Lilienthal and other pioneers.

Of the war machines, the collection ranges from the early Taube, through the 1915 types, such as the L.V.G., the Albatros and the Fokker monoplane, to the well-known later fighters—the Albatros D.III and D.V, the Halberstadt, the Pfalz, the Fokker D.VII, the Fokker triplane and a 1918 Fokker monoplane of shoulder-wing design, which I was told was very fast indeed for its time, but which was never made in quantity.

The scarlet D.V. that was the mount of Baron Manfred von Richthofen is a prized exhibit.

Of later two-seaters there are the Rumpler, L.V.G., Albatros, Junkers, etc. Wandering through the large hall among the old war-time machines one could recapture some of the fascination of those days when, in the summer of 1917, we used to tumble about in the Flanders skies.

Citizens of London who remember the air raids would be interested to see the central nacelle of one of the four-engined bombers used in the raids on London. They were big, clumsy affairs—the control nacelle is strangely like the nacelle of an airship. Photographs alongside show the complete machines. Looking on them now, they appear as antiquated as the ships in which Vasco da Gama sailed the sea over 300 years ago.

In the Deutsches Luftfahrtmuseum I saw for the first time war-time German aircraft with wooden wheels. Rubber was scarce in the Reich then. A synthetic substitute had not been found. The wooden rims were built up with wire spokes which gave a certain amount of resilience. But my guide from the Air Ministry told me the wooden wheels made "a terrible noise" when taking off and landing.

Among exhibits are two British aircraft—a D.H.4 presented by the Nizam of Hyderabad and a British fighter brought down on the Western Front. The latter was wrongly labelled. The card in front of it bore the inscription, "Bristol single-seat fighter, fitted with Humber engine." Actually it was my old friend the Sopwith Camel, with a Clergêt engine built by Humber under licence. I pointed out the error in classification to Captain Krupp, and I have no doubt that future visitors to the museum will find the description correct.

An Early Giant

Of post-war machines there is a representative collection of the earlier German transport 'planes, crowned by the Dornier Do.X. The giant flying-boat stands in the large hall fully erected—a prophetic forerunner of eventual Transatlantic aircraft. As an aeronautical achievement the Do.X was magnificent, and it is worthy to be displayed as it now is in the Berlin Air Museum.

In one annexe is the Hall of Heroes, containing busts of the great German airmen, with relics of those who have died.

In the Gallery of Photographs are countless specimens of all types of aircraft, ranging from early prints of pre-flying days to modern times. For philatelists there is a fine collection of aerial stamps. For the curious there is a room dedicated to a collection of oddities—pieces that survived war- and peace-time crashes.

My one regret was that I did not have sufficient time to examine the individual exhibits with as much care and thoroughness as I would have wished. But I am determined when next I visit Berlin to reserve a whole day to spend among the war-time German aircraft. And I left the museum with the thought that the time must come when it will be regretted bitterly in Great Britain that we have not seen fit to preserve specimens of our war-time aircraft in an equal manner. The few types of historical aircraft that were shown in the last R.A.F. Display at Hendon could be outnumbered time and time again in Germany by the Deutsches Luftfahrtmuseum.

[*The next article in this series will describe a visit to the Richthofen Squadron.*]

Forthcoming Events

March 11. R.Ae.S. Lecture*: "Airscrew Blade Vibration," by Major B. C. Carter.
March 12. Leicestershire Aero Club: Annual Ball, Grand Hotel, Leicester.
March 12. Cinque Ports Flying Club: Annual Dinner and Dance. Grand Hotel, Folkestone.
March 16. R.Ae.S. Students' Section: Discussion on Stressed-skin Construction, R.Ae.S. Library, 7 p.m.
March 18. R.Ae.S. (Coventry Branch) Lecture: "Navigation," by Sqn.-Ldr. Godsave. Armstrong Siddeley Canteen, 8.15 p.m.
March 27-30. Yorkshire Gliding Club: Easter Meeting, Sutton Bank.
March 30—April 12. Ely Aero Club: Easter Instructional Course.
April 3. Rugby: R.A.F. v. Army, Twickenham.
April 8. R.Ae.S. Lecture*: "Control Problems," by Mr. A. G. Pugsley.
April 10. Aero Golfing Society: Martlesham Match.
April 15. R.Ae.S. (Coventry Branch) Lecture: "Production and Inspection Methods Applied to Screw Threads," by S. J. Harley. Armstrong Siddeley Canteen, 8.15 p.m.
April 22. R.Ae.S. Lecture*: "Power Plant Trends," by Mr. G. J. Mead.
May 6. Aero Golfing Society: Instone Trophy.
May 13. Leicester Airport Coronation Air Display.

* These lectures take place at the Royal Society of Arts 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

Six hundred and fifty acres of ground at Oakley Hill have been purchased by the Bedford Town Council at a cost of £8,500. It is to be used for a municipal airport.

The upper component of the Short-Mayo composite aircraft should be flying within the next three months. Except for wing covering and the installation of certain items the lower component is almost complete.

Major "Al" Williams has taken delivery of his 290 m.p.h. Grumman single-seater with 1,000 h.p. Wright Cyclone engine. He welcomed 1937 by diving it up to 360 m.p.h. over Roosevelt Field.

Twenty-five Years Ago

(From "Flight" of March 2, 1912.)

"Filey Bay should shortly see the trying out of a new hydro-aeroplane, with which the Blackburn Aeroplane Co. intend to experiment, in view of the increasing importance that is being attached to the production of a machine which will rise from and alight on water."

SPLICING THE MAINBRACE : One of the new Shell refuelling tenders ministering to the Empire boat *Cambria* during a demonstration at Southampton last week These tenders carry 2,500 gallons of spirit and 200 of oil, and deliver the former at 120 gall./min. Twenty-one are under construction, by Dunstans, of Doncaster, Rowhedge Ironworks, of Colchester, and Thornycrofts. Others are being built for use along the routes.

"Tommy" Tomlinson has taken the T.W.A. "overweather" Northrop Gamma (Wright Cyclone with two-speed blower) up to 36,000 ft.

The Cyclone-engined Seversky amphibian in which Major Alexander de Seversky set up a world's record of 209.4 m.p.h. over 100 km., has been acquired by Roberto Fierro, former chief of the Mexican Air Corps.

Thirty-six per cent. of the civil aeroplanes built in the U.S.A. last year were Taylor Cubs. No fewer than 550 Cubs were sold.

Captain Alex Papana, the Roumanian aerobatic expert, has ordered a Bellanca, presumably one of the low-wing cantilever monoplanes with P. and W. Twin Wasp engine, for the Transatlantic race.

A display of physical training will be given by the R.A.F. at the Royal Tournament, to be held at Olympia from May 27-June 12. An R.A.F. guard of honour will also be provided when the Tournament is opened by the King.

Mr. David Llewellyn, who left Croydon last Friday in a Percival Vega Gull in an attempt to fly to the Cape and back in record time, had to abandon his flight the following day just below the Fourth Cataract on the Nile. A choked oil feed seems to have been the trouble.

The Ranger Engineering Corporation, a Fairchild subsidiary, is in small-scale production with the 420 h.p. inverted vee engine with a potential output of 600 h.p. for military service. Under development is a 24-cylinder "H"-shaped unit to be commercially rated at 800-900 h.p. and giving, it is hoped, up to 1,200 h.p. for special purposes.

FITTINGLY AUSTERE : The grim but impressive R. 101 Memorial at Beauvais, France. It bears the inscription : "A la Memoire des Victimes de la Catastrophe du Dirigeable R. 101, 5 Octre., 1930."

Not the airport of the future which our contributor visualises, but one which is rapidly becoming actual fact—the new Le Bourget, the terminal building of which is nearing completion.

AIRPORT TRENDS

Will the Passenger Aerodrome of the Future Have Uni-directional Landing Between "Air Screens"?

By GRAHAM DAWBARN

THE repetition of detailed requirements for airports can become tedious. Detailed particulars as to obstruction angles, landing ground dimensions, gradients, heights of hangar doors, functions and arrangements of rooms in a terminal building; the exact furnishing of a control tower; lists of medical requirements, and so on, taken from the last edition of pamphlet 55; all these and more have so often been analysed.

With, I hope, the indulgence of the Editor I have shirked my mission and give no facts at all. I do give one idea. I hope it will be provocative.

The future of the air is on the ground. This has, no doubt, been said many times before. Air development has reached a stage when it cannot be twisted into a joke.

Aircraft can now be designed to cross any ocean; to give practical guarantee against failure; and to cruise at a speed which, given ground organisation, would bring any two points of the world within three days of each other. It will overcome all danger of ice formation; it will fly satisfactorily at all normal altitudes; its size, comfort, speed and quiet will still further improve; its fuel and engines will give ever increasing efficiency.

Into the Future

The vital problems of the future lie on the ground. The first is control, the second is the certainty of all-weather operation—or, more precisely, all-weather landings. Both problems have to a limited extent been already tackled. In each case a partial solution is apparent.

The air is used for numerous purposes. For private flying, for joy rides, for survey work, for archæology, exploration, spraying crops, for the study of animal life, for forest preservation and fire-fighting, and for the transportation of passengers and freight.

In like manner the sea has been used for private sailing, for "joy" cruises, for exploration, cable laying, for fishing, and for the transportation of passengers and freight.

The most important of these is the last. So will it be in the air.

I anticipate the time not far distant when the air will be almost entirely reserved for the professional air pilot and his crew, who will carry out the serious and regular duties of conveying passengers and goods—but primarily passengers—from one point of the earth's surface to another. No aircraft will start on any journey without full and exact knowledge of the precise route on which it will travel.

So far as space is concerned there is no true parallel to the air. The best comparison is the sea. The road is the worst; any comparison between air and road is useless and vicious. For space compare air and sea; for time (or "journey units") compare air and rail.

The suburban rail journey occupies half an hour; the short rail journey two hours, the longer rail journey four hours, and the night journey ten to twelve hours. The rail journeys across Canada or the United States of America take four days.

The "suburban" air journey occupying half an hour will take you 100 miles; from London, the "short" journey of two hours will take you to Hanover, Frankfurt, Lyons or Bordeaux; the "longer" journey of four hours to Stockholm, Vienna, Rome or Majorca and the night journey to Baku on the Caspian Sea, to Egypt, pretty well to the Gold Coast, or across the Atlantic.

Accommodation in the air will be similar to the accommodation given in the corresponding "time category" in railway trains. Aircraft may normally carry up to 200 passengers and weigh up to 200 or 300 tons—approaching the weight of a main-line express train.

Now what of airport requirements?

The original demands of the Air Ministry were for "all-way" fields. Runs in all directions of 800 yards were considered superlative. The layman constantly foresaw smaller fields—the expert foresaw and demanded larger ones. "All directions" became "eight directions," and 800 yards became 1,000 yards. In theory, however, the landing ground still remained a disc. A disc with hunks cut out of it, perhaps, but still a disc.

The Fog Influence

Then came the epoch-making idea: fog landing. The Air Ministry had to formulate some requirements so it formulated one run 1,300 yards long by first 600 yards, and shortly afterwards 400 yards wide. The disc became an ellipse. It became in actual fact all sorts of curious shapes, but the proper theoretical shape was, and is, an ellipse.

The logical outcome of this move is for aircraft to tend to land and take-off along the main axis in fog, snow, heavy rain, low cloud and in still or fairly still weather. In fact, to land and take-off along the main axis under all conditions except definite cross-wind.

But airports must still be laid out to cater for multi-directional landings. The same old bugbear exists against tidy and economical planning. It is humanly impossible to design and zone an airport complete with traffic centre which can deal with perfect efficiency with traffic arriving or departing at any instant from or to any point of the compass.

What is the final answer? It is a uni-directional landing coupled with—if I may coin an ugly word— the "break-air."

At the end of its journey the ocean liner passes through breakwaters into harbour where, untroubled by storms and currents, it moves ponderously, but with delicate assurance to

its allotted berth. For high-speed all-weather inter-Continental services I visualise aerodromes (including zoning) perhaps ten miles long by 600 yards wide, with slotted graduated air-screens all down either side.

The station—and it is a real station this time—stretches in a series of bays across the centre of the airport. The approaching liner, after guidance throughout its flight, runs on to its particular set of invisible rails five miles from the station, touches down 1,000 yards from the station and draws up in its selected bay.

After unloading its passengers it may go to a siding for a few hours, or it may refuel and reload and move straight forward to its departure. There is no possible conflict between arrivals and departures; zoning is only required at each end (instead of all round), and the surfaced landing ground is merely some three miles long by 600 yards wide. Incidentally the aerodrome slightly tapers towards the centre like a loosely rolled tightly tied parcel. The lemon, which was an orange, has become a banana.

The surfacing itself—and it will be pretty tough to withstand ten tons a square foot—may be restricted to ever so slightly converging strips 100 feet wide. The problem of perfectly drained artificial surfacing over a square mile is gone.

The "general public," thank heavens, also disappears. (It occupies its leisure in conducted tours over "ye olde" remains so carefully preserved at Croydon, Gatwick and Heston.) The air is no longer romantic. It is merely a serious, normal and incredibly quick means of transport. You merely have dinner in London and awake in Asia.

Beneath the platforms is a great traffic hall connected on one side to road and rail, and on the other to a little taxi ground. This taxi ground (which is, of course, outside the main airport) serves moving-wing air-taxis which, with particularly selected pilots (or will it be robots?) operate from our old friends the centre-city towers. Needless to say, they do not travel down the traffic routes. They have cross-routes of their own and only operate between airports and adjoining city centres.

There are no wrecks in the air. The dangers of aircraft circling around aerodromes and landing at different angles will vanish. Everything will fly on accurately prescribed routes, and where routes cross they will cross at considerably different levels. Disaster cannot live with control. Only speed remains.

Famous Designer Resigns

THE British aircraft world will learn with something of a shock that Mr. A. E. Hagg is resigning his position as director and chief designer of the De Havilland Aircraft Co., Ltd. Those in the aircraft industry who knew that Mr. Hagg had fairly recently become interested in boat-building probably jumped to the conclusion that he was forsaking his old love for a new. This, *Flight* is very glad to state, is not the case, and Mr. Hagg will continue to be connected with the industry with which he has been associated so long and so effectively. Of his future plans nothing may, however, be said at the moment.

Mr. A. E. Hagg.

Arthur Ernest Hagg was born in Brighton in 1888, and educated at Bournemouth. He joined the Aircraft Manufacturing Company in 1915 under Capt. G. de Havilland, and when the De Havilland Aircraft Co., Ltd., was founded, he, with many others, including Capt. C. C. Walker and Mr. F. T. Hearle, transferred with his old chief from Hendon to Stag Lane.

It is not without significance that the first really economical aeroplane, the Fox Moth, was Mr. Hagg's very particular "baby." That machine was far and away the most efficient which the company had produced, carrying pilot and up to three passengers on a Gipsy engine of but 120 h.p. Put in a different way, the Fox Moth carried as disposable load more than 90 per cent. of its own tare weight.

The Fox Moth was followed by a long series of types destined to become popular, such as the Dragon (also remarkably economical), the Dragon Rapide, the D.H.86 and the Comet, which won the England-Australia race in 1934. Again, efficiency was the keynote, the Comet approaching quite closely to Professor Melvill Jones's "Ideal Aeroplane." Recently Mr. Hagg has been engaged on the design of the D.H.91 Albatross, which incorporates a great many unorthodox features, and which is now merely awaiting engines before making its first flight.

Mr. Hagg will carry with him to his new venture the good wishes of everyone in the British aircraft industry.

Cult of the Miniature Camera

THE modern miniature camera often finds a place in the kit of the private pilot who wishes to keep a pictorial record of the aviation meetings in which he participates.

To-day there is a very wide choice of these fascinating little instruments at prices to suit all purposes. How wide is the choice may be gleaned from the special Miniature Camera Number, on sale March 10, of *The Amateur Photographer*—which, incidentally, features in every issue "Miniature Notes" devoted entirely to the use and description of tiny cameras.

Aerodrome Surfacing with Bituminous Emulsions

VISITORS to the Aerodrome Owners' Association Exhibition will recollect the exhibit of Colas Products, Ltd., who showed samples of the aerodrome surfacing treatment in which they specialise. The process is such an interesting one that some details may not come amiss.

It is claimed that the use of bituminous emulsions forms an ideal method of providing permanent and easily maintained landing surfaces, since the type of preparation which can be done is readily varied to traffic or cost requirements. Colas emulsions are the product of pioneers in the industry.

Earth stabilisation by means of Terolas emulsion is at once one of the most effective and economical systems to adopt. In outline, the method consists of removing turf and mixing the subsoil with Terolas at a rate sufficient to render it resistant to the combined actions of traffic and weather. The soil is loosened by means of ploughs or harrows, and mixing, which may be carried out by the "mix-in-place" technique or by premixing in batches in a paddle-arm or rotary concrete mixer, should normally be at a rate of ¾-1 gall./cu. ft. of loose-packed soil. The mixture is then graded or spread to levels, according to the mixing process adopted, and when it has become sufficiently hard to bear rolling without excessive pushing is rolled with a 2½-ton roller.

Such work is surface sealed by means of Standard Colas, but unless inclement weather is feared sealing may be deferred until the area has been under traffic for a period and is thoroughly consolidated. The seal coat is supplied at 3 sq. yds. per gallon and blinded with ¼ in. or ⅜ in. granite or limestone chippings or shingle.

Special Problems

Cases will be found where owing to clay content or for some other reason a soil is not amenable to stabilisation. The difficulty can usually be overcome by addition of a proportion of imported aggregate, generally of a cheap nature. Colas Products, Ltd., state that they are glad to investigate such cases, free of charge.

For more heavily trafficked airports, or where funds permit, imported aggregate runways may be constructed on a principle similar to the above but using Colasmix emulsion, which is suitable for mixing with broken stone containing only a small proportion of fine material.

In this case the subsoil is consolidated after removal of turf, and the aggregate may either be spread and mixed-in-place, or premixed in a suitable concrete mixer. The work is surface sealed in exactly the same manner as Terolas work.

The use of imported aggregate also lends itself to Colas-grouted or penetration macadam construction. After removal of turf, and consolidation of the subsoil, the stone is spread to levels and sprayed with Standard Colas. After application the surface voids are "racked up" with ¼ in. chips and thorough rolling given. Details for sealing are exactly the same as for pre-mix work with Colasmix.

In cases where an extremely hard-wearing surface is required to withstand very heavy traffic a combination of soil stabilisation and pre-mix or grouted methods can be adopted, using the former as sub-grade on which to impose the latter. By this means all types of requirement may be fulfilled, including aprons, service roads, car parks, etc.

Full details are obtainable on application to Colas Products, Ltd., Norman House, 105-109, Strand, London, W.C.2.

Topics of the Day

Basic Understanding

A FEW weeks ago I met quite an experienced amateur pilot who, it appeared, had not got the slightest idea of the reason why his C.D.C. provided him with the results demanded. He knew most of the more important tricks which can be performed with this instrument, and had used it consistently and successfully for the past few years.

All well and good. But if, by any chance, he had forgotten the exact sequence of movement for any particular calculation he would have been lost without a basic understanding of the principles involved. Hence the examinations for navigators' licences. Hardly any of the methods used in the examination in D/R can, in fact, be used in the normal-sized transport machine with a crew of one or two, but every one of them gives the professional pilot the knowledge which is necessary for guesswork navigation and for the safe operation of calculating machines.

The majority of amateurs probably take a semi-professional interest in the subject of navigation once they have passed the initial stages and are beginning to make use of an aeroplane as a means of serious personal transport. I do feel, however, that elementary navigation should be compulsorily taught at all clubs and schools as a preliminary to the "A" licence tests, or, at least, as a preliminary to entering the cross-country or any similar category.

Questions on this subject might usefully be included in the "A" licence oral examination. It is far more important that an applicant should understand the principles of D/R than that he should know the number and the nature of the lights carried by an airship which is out of control, or the aural signals to be given by the crew of a flying boat which is at anchor in conditions of poor visibility.

Ground Training

WHEN I was examined for my "A," people probably took a greater interest than is now usual in the correctness or otherwise of replies in the oral. I was asked, in all seriousness, what I should think if I saw before me, while flying at night, pairs of superimposed white lights at intervals of 1,000ft., and what signals I should display if, after being forced down in a flying boat, I was drifting out of control on the surface of a sea which was heavily populated by other craft.

So successfully had I crammed myself with useless knowledge that I was able to answer these questions with great accuracy, but was unable to give the far more important answer to a question concerning right of way on a crowded aerodrome. Nor, had I been asked, should I have been able to explain how one should make an allowance for drift, either by the use of a C.D.C. or by drawing a vector diagram. Any question about the sequence of operations used in either starting a Cirrus I engine or in folding a Mark I Moth would have left me with my mouth open and with a sort of creeping paralysis inside the brain.

I wonder how many club-trained "A" licence pilots could answer these questions even now. Nobody ever taught me how to swing an airscrew, how to flood a carburettor, or how to clear a warm engine suffering from an over-rich mixture. I found out for myself by watching ground engineers and by a species of trial and error. The latter method, applied to airscrew swinging, might well have had fatal consequences; applied to the wing-folding process, it might at least have been very expensive. I fooled about with an extensible jury strut for a long time before I realised that its end was merely placed in a slight hollow in the lower wing. Yet, with an extensive car and motor cycle experience, I was at least as mechanically minded as any pupil is likely to be. Some people are just psychologically incapable of remembering which way a nut should be turned and of understanding the plain principles behind the Heath Robinson cycle of operations in any internal-combustion engine. Some day an inventor will produce an engine which does not involve the use of so many moving parts for such a ridiculously small power output.

Running Up

WHILE on the subject of engines, it is, I think, worth mentioning that, because a particular motor has been run-up once in the morning, it does not necessarily mean that this engine is going to work properly after a lunch-time cool down. As one of the world's more frightened amateurs, I am all in favour of warming and running-up an engine after every stop.

Once upon a time I was taken off in a fully loaded twin-engined machine from a small aerodrome when I knew perfectly well that the engines had not been run for six hours, and that the only warming they received was during the taxying process. A cut or a temporary shortage of power would, in this case, have precipitated the whole lot of us either into a village street or into a harbour which lay just beyond the village. There and then I made a firm rule to test an engine whenever I was about to leave a small aerodrome with lethally arranged surroundings.

Modern machines usually have brakes, and the business of running-up does not take more than half a minute. Even if the brakes will not quite hold the machine, it is possible to look at all the dials while moving slowly forward immediately before taking off. It is so silly to die for the sake of the odd minute or to save a little trouble.

INDICATOR.

FROM the CLUBS and SCHOOLS

LONDON

CLUB machines flew 62 hr. 5 min. at Hatfield last week. New members are Miss M. Davy, Miss I. B. Clay, Mr. F. J. Elliott and Mr. A. G. Wainwright.

REDHILL

In spite of the weather, the Club put in 48 hr. 50 min. flying during the week ended February 26.

YAPTON

Flying times for the month of February were 62 hr. 15 min.; the story of the weather being, as usual, bad. The night flying Moth has finished its C. of A. and is in service.

LINCOLNSHIRE

During February the Club aircraft flew 34 hr. 20 min. Cross-country flights were made to Norwich, Nottingham, Sherburn, Meir and Walsall. New members are Messrs. Mitchell, St. Aubyn and Bratley.

BORDER

The strong and gusty winds have prevented any machines leaving their hangars during the past few days. The Theatre Club challenged the Flying Club to a "Bar Billiard" match last Thursday and won on points, each side winning two matches. A return battle is arranged for March 14.

NORFOLK AND NORWICH

Two pupils of the commercial training school, Messrs. R. D. Hesketh and D. Bradley-Watson, have obtained their passenger-carrying certificates. During the past week a number of cross-country flights have been made.

SOUTH COAST

Weather during last week was extremely bad with the exception of Tuesday, when the Club put in over twelve hours' flying. Sixty members from Shoreham went to the Four Clubs dinner. Miss Brun, of Copenhagen, and Mrs. Masters have joined the Club and are starting flying.

CAMBRIDGE

Marshalls' Flying School put in 55 hr. 45 min. during the week ended February 28. Messrs. Ramsay and Charters completed their first solos, while Mr. Charters passed the tests for his "A" licence. Cross-country flights were made to Hatfield, Sywell and Norwich. A good deal of flying has been done on the Puss Moth, and one or two members have been taking instruction in blind flying.

MIDLAND

Flying times to February 26 were 23 hr. 20 min. dual, and 18 hr. 15 min. solo and passenger. Owing to adverse weather conditions flying had to be cancelled on several days. Mr. H. Riches has joined as an ordinary member. A dance will be held in the clubhouse on Saturday, March 6, at 9 p.m.

SOUTHEND

Bad weather curtailed flying, as elsewhere, during the week. Among visiting aircraft was Miss Jennis Broad on a Hillson Praga on her way to demonstrate at the Romford rally. The sixth Birthday Dance was held on February 27 and registered a record attendance. A Club supper will be held on March 12 at 8 p.m.

HANWORTH

Club machines flew 37 hr. 50 min. last week, while cross-country trips were made to Shoreham and Portsmouth. New members are Mr. Paul Huber (Air League of the British Empire) and Mr. Elliott (National League of Airmen). Aeroncas have recently been in great demand, although weather conditions have not been very satisfactory. On St. Patrick's night—March 17—a Fancy Dress Carnival Ball will be held in the Club.

BROOKLANDS

Flying time for the past week was 50 hours, most of this being dual instruction. Included in this latter was a new private owner, Mr. Ridsdall, who has taken delivery of G-ABJI. Messrs. Orton and Bailey flew a Puss Moth from Renfrew during the week, accomplishing the journey with the aid of a strong northerly wind in the remarkable time of 2 hr. 50 min. The annual dinner and dance was a great success, in fact the biggest yet in the history of the Club, some 200 members attending. A report appears on page 210.

MADRAS

Machines of the Madras Flying Club put in 173 hr. 10 min. during the month of January. Mr. P. Triou has gone solo, while new members are Mr. Saravanam and Mr. Alsac. The newest addition to the Club's fleet, the Leopard Moth, became the subject and focus of a ceremony held at the flying club on January 11, when H.E. the Governor and Lady Marjorie Erskine visited the Club for the purpose of christening this machine. Accompanied by the Director-General of Posts and Telegraphs and in connection with the air mail extension to Ceylon, Mr. Tymms and Mr. Vintcent recently visited Madras on a Miles Merlin. Mr. Leete, of the Directorate of Civil Aviation, paid an inspection visit towards the end of the month.

PORTSMOUTH

Although three days of last week were unsuitable for flying, the Club machines put in twenty-one hours. Mr. P. R. Hornidge has obtained his "A" licence, and new members are Miss H. J. Pirie-Thomson, Miss M. K. Halliday, Mrs. G. F. Halliday, Sub. Lt. J. D. Neale, R.N., Mr. A. M. De Havilland Bell and Mr. James Halliday. The first annual general meeting of the Club since it was taken over by the Portsmouth Aero Club, Ltd., was held in the clubhouse on February 24. Points of interest in the chairman's report, read by Sir Charles Rose, Bt., in the absence, owing to illness, of the chairman, Mr. O. R. Guard, were that membership had increased from 158 to 250, that a second instructor had been engaged, and that possibly one or two machines would shortly be added to the fleet.

CINQUE PORTS

High winds, low cloud and rain, not to mention snow, have again interfered with the Club's flying activities, although week-end pilots put in several hours. Mr. Tom Hackney, who is taking his "B" licence, is rapidly piling up hours in his Moth, and has passed his medical examination. The sales department have again been busy. Mr. C. A. Wilson, of Hastings, has placed an order for a B.A. Swallow fitted with a Cirrus Minor engine, and a Pobjoy Swallow, which used to belong to Mr. Wilson, has been sold through the Club to another member, Mr. E. A. Strouts, of Biddenden. The Monospar has been fitted with two-way wireless for both W/T and R/T. It is also hoped shortly to equip a wireless room on the premises. Two new apprentices, Messrs. Winter and Richards, are shortly starting work in the shops. About thirty members attended the Four Clubs dinner.

PRIVATE AMPHIBIAN: After one has learnt to hold off, while landing, at about twice the height of a normal undercarriage, this Edo amphibian gear—shown fitted to a Waco—should have definite advantages. The tail of each float is hinged and sprung to take tail-down landing stresses and the whole gear weighs 175 lb more than the standard float arrangement.

Private Flying

C. A. S. C.

Indifferent weather resulted in a total flying time of 7 hr. 15 min. at Cambridge last week. Even worse conditions have prevailed at Gravesend, allowing only 1 hr. 30 min. flying to be done.

BOMBAY

Flying times for February aggregated 268½ hours. The Hon. Secretary, Mr. P. N. Ritchie, qualified for his "A" licence. Three machines of the Club flew down to Rajpipla State and were welcomed by His Highness at the aerodrome. A large number of joy-rides were given, which necessitated one machine remaining in the State for four days. A new Gipsy Major Moth has recently been purchased, bringing the fleet up to six machines. For the fourth year in succession a fleet of four aeroplanes will leave Juhu early in June for Heston and will remain in England for three months. During this time they hope to visit many clubs in England.

LEEMING

New members are Messrs. Dent, Spandon and C. King Clark (the last-named has recently taken delivery of a Miles Whitney Straight, in which he intends to fly to Egypt during the coming week), while new pupils are Messrs. Dove and Barrowclough. Mr. I. D. F. Proctor has gone solo. Visitors during the week included Mr. Packenham, the two Flt. Lt. Atcherleys, Lord Grimthorpe and Mr. Jones, of the North Eastern Airways, and several officers from Catterick Camp. Arrangements for the International week-end are going ahead, several acceptances having already been received.

General Council

AT the meeting of the General Council of the Light Aeroplane Clubs, which was held on February 17, it was decided that R.A.F. support, promised for two meetings, should be given to the Cinque Ports and the Plymouth Clubs' flying meetings.

Mr. R. Ashley Hall, Major A. Goodfellow and Major R. H. Thornton were elected to the R.Ae.C. Racing Committee, and Col. Sir Joseph Reed was re-elected vice-chairman of the Council.

Vacations at Ely

BETWEEN March 30 and April 12 the Ely Aero Club is organising a special Easter flying course on Drones. Any pupil who gets through his course in time to complete three hours' solo on Moths will, of course, have an "A" licence available for all types. Special lectures and maintenance instruction will be given. The fee for the course, including a year's club subscription and accommodation, will be £20. The club's official address is City Chambers, Market St., Ely, Cambs.

G.E. Examinations

THE examinations for ground engineers' licences will be held at the following places and times:

(a) London, weekly, on each Tuesday in April, May and June; (b) Croydon, on the second Friday in April, May and June; (c) Manchester, on the first Friday in June; (d) Bristol, on the first Friday in April; and (e) Glasgow, on the first Thursday in May.

Applications should be made to the Secretary, Air Ministry (C.A.2), Adastral House, Kingsway, London, W.C.2, on C.A. Form 2B.

Associated Sociability

THE second annual dinner and dance of the Brooklands Associated Flying Clubs at the May Fair Hotel, London, was one of those first-class gatherings after which each guest begins to think about reserving a table for next year's. After "The King," Mr. Percy Bradley, the chairman, very briefly proposed the toast of "The Four Clubs," remarking that Capt. Duncan Davis, who was to reply to the toast, was one of the finest speakers and should certainly do any speaking that had to be done.

Capt. Davis then gave a very brief and humorous survey of the founding of the club. He said that Northampton now had new hangars, a larger field and a reserve school, that club secretaries and committees were blamed for every fortunate or unfortunate event on the whole aerodrome, but that the success of the clubs depended entirely upon them. He added a tribute to the excellent work of the ground engineers and said that the instructors all flew "hands off" and never said "I've got her" until the next world was very near. Then the band, whose average age was 17, got everyone on the move with popular melodies. A cabaret, including Mr. Claude Dampier, followed, and dancing continued until 2 a.m.

The Tenth at Norwich

SOME 150 guests attended the tenth annual dinner of the Norfolk and Norwich Aero Club, which was held last Thursday.

The president of the club, Sir Henry Holmes, was in the chair, and Lord Sempill was the guest of honour.

Second International at York

ON June 4, 5 and 6 the York and Leeming Flying Clubs are organising their second international flying meeting. This will include a handicap race, demonstration flying and a visit to the Sutton Bank gliding centre.

Hampshire's Eleventh

AS one of the first half-dozen light aeroplane clubs to be formed in this country, it was right and proper that the Hampshire Aeroplane Club's eleventh annual dinner, held last Friday, should have been graced by the presence of so many well-known people—among them, as guests of honour, being Sir Francis and Lady Shelmerdine. After many years of unavoidable absence, the president of the club, too, Lord Louis Mountbatten, was in the chair—he had actually changed in the train from London, and arrived more or less on the stroke of the gong (or on the first words of the toastmaster).

In proposing "The Club," Councillor R. J. Stranger explained how the club had been an asset to the Southampton airport, giving that impression of activity which is so important in the case of a newly developed aerodrome.

Mr. G. H. Winn, replying, gave details of the club's progress during the past year. A Leopard had been bought so that anyone "could leave Southampton in a hurry by day or night," and a contract had been obtained for delivering newspapers to the Isle of Wight. Alterations had also been made to the buildings so that sleeping quarters could be provided for pilots. The two trophies for blind flying and safe flying had been won respectively by Lady Hoare and Mr. J. Winning. The latter collected his there and then from the hands of the president.

After running through the list of important guests, Lord Louis Mountbatten, in proposing their toast, explained that Lady Louis was flying around Africa and so was not able to be present with him. Referring to his recent appointment to the Naval Air Division at the Admiralty, he explained how, after slight discomfort following his discovery that so many of his new subordinates were men of long, practical experience, he had searched his memory and found he had flown in 1911 with Air Marshal Longmore, and in 1906 as ballast in a Parseval airship.

Sir Francis Shelmerdine had one very welcome piece of news to impart in his reply. The Air Ministry was working on an idea to encourage, by some form of subsidy, those pilots who did not normally continue their flying after obtaining a licence. The Hampshire Club had trained 300 pilots in the last eleven years and had earned £15,000 in subsidy.

Toasting the chairman, the Rev. E. Bruce Cornford was not too charitably humorous at the expense of the powers that be (in the Admiralty and elsewhere) and of the Portsmouth Council, who had, it appeared, agreed to build an Empire base by a majority of two.

New Scandinavian Airports

THREE new airports are planned for Denmark. The choice of sites near Esbjerg and Aalborg (both in Jutland) and Rönne (Isle of Bornholm) has been sanctioned by the Danish Air-Traffic Department. The aerodromes, which are constructed with a view to planned internal airlines, will be completed by the spring of next year.

Meanwhile, about 5½ million Kr. have so far been spent on the building of the new Oslo airport at Fornebu, which was commenced on October 1, 1934. A large quantity of rock had been blasted away, but even that was only part of the work necessary. With the exception of a Government allowance of 300,000 Kr. all the costs of building the new airport are borne by the Municipality of Oslo. When completed, the Fornebu airport will have required a total outlay of nearly 12 million Kr., but it will then be the most up-to-date airport in Scandinavia. Two other Norwegian airports are in course of construction near Stavanger and Trondheim.

Mr. Petersen, chief of the West Norwegian Meteorological Service has been compiling special weather and visibility reports for the North Sea during the past five years, in order to judge the conditions for services between England and Scandinavia. Aberdeen Airways, it will be remembered, are due to start their Norwegian service in the spring.

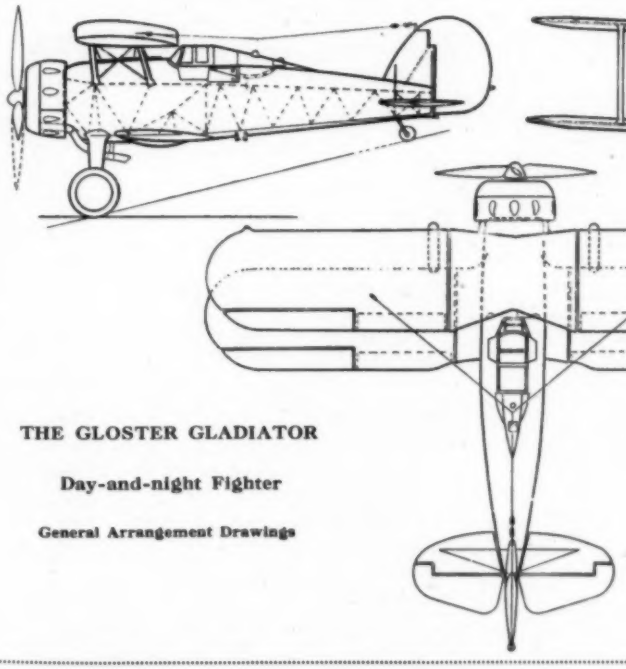
ENTRY of the GLADIATOR

Production Gloster Fighter Now Being Delivered to Squadrons : Manœuvrability Combined with Speed : Flaps Increase Speed Range to 4½ : 1

A Gloster Gladiator (Bristol Mercury IX) above its native Gloucestershire. Note the transparent cover over the pilot's cockpit. (*Flight* photograph.)

MANY interesting features are found on close examination of the Gloster Gladiator, which is now being produced in very large quantities at the Hucclecote works of the Gloster Aircraft Company. Some delay in production was unavoidable in view of the rebuilding of large sections of the old factory and its extension into new works, but the production of the "bits and pieces" has proceeded, only the final assembly having been held up somewhat by the works extensions. Now, however, the Gladiators are erupting on to the aerodrome in a steady stream, and a number of fighter squadrons in the R.A.F. are looking forward to giving their new equipment a thorough try-out. From the reports of the Gloster test pilots there is little doubt that the Gladiator will very rapidly become as popular in the squadrons as is its predecessor, the Gauntlet.

In a general way the Gladiator resembles the earlier type, but various refinements have been introduced which have resulted in a very marked increase in performance. The biplane wings have single-bay instead of two-bay bracing, and the undercarriage is of the Dowty cantilever sprung-wheel type, which probably offers remarkably small drag. The Plastilume-moulded Perspex roof over the cockpit should add several m.p.h. to the speed, in addition to affording protection at the great altitudes at which the single-seater day-and-night fighter has to do its work. (The service ceiling is 35,000 ft.) The Bristol Mercury IX engine is of 730/840 b.h.p., and gives its maximum



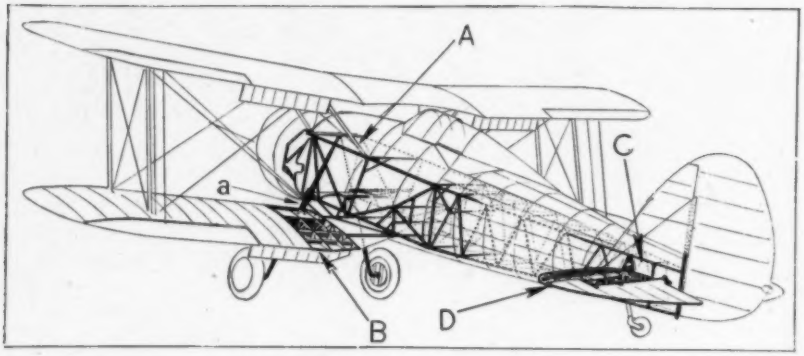
THE GLOSTER GLADIATOR

Day-and-night Fighter

General Arrangement Drawings

MAIN DIMENSIONS.

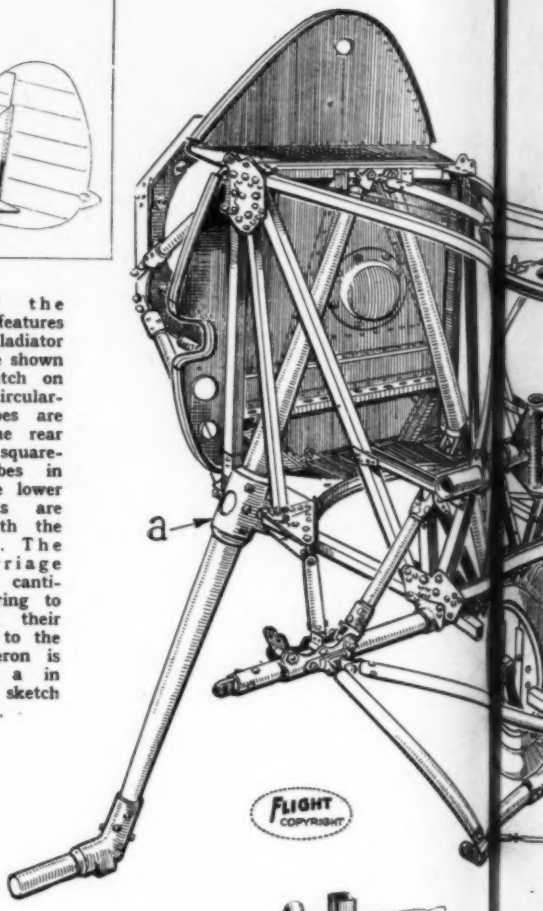
Overall Length	27 ft. 5 in.
Overall Span	32 ft. 3 in.
Wing Chord	5 ft. 9 in.
Wing Area	323 sq. ft.
Tailplane	19.3 sq. ft.
Elevator	18.24 sq. ft.
Fin	5.9 sq. ft.
Rudder	14.5 sq. ft.



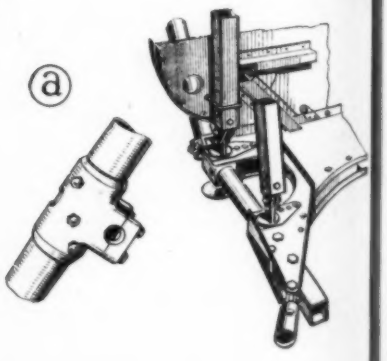
power at 14,000 ft. The combined Townend and exhaust ring may be assumed to play its part in the general reduction of drag, and the efficiency of the machine is indicated by the fact that the top speed is 253 m.p.h., while the speed range, when using the trailing-edge flaps, reaches the very good value of $4\frac{1}{2}$: 1.

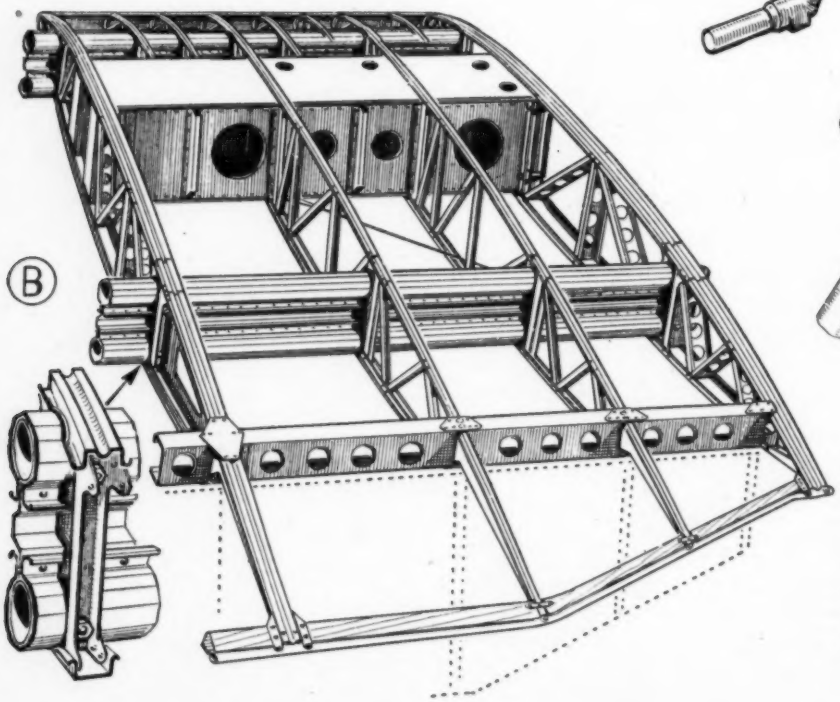
In spite of the growing popularity of the monoplane there are still many people, including a number of fighter pilots, who believe that, provided the speed of the fighter is sufficiently greater than the speed of the bomber against which it is being used, the biplane has much to recommend it, its smaller overall dimensions and lower moments of inertia making it more nimble in manœuvres than the heavier and larger monoplane. While that view persists there is no cause for regretting that the Air Ministry is still taking delivery of biplane fighters.

Structurally, the Gladiator is a quite simple and straightforward aeroplane. The fuselage is built on the well-tried Hawker system, the rear portion having tubular longerons of circular section, with flats formed at the points where the struts are attached. The forward fuselage portion is built up of square-section tubes, the joints being of the flat-plate type. In the wing construction also one finds Hawker influence, the main spars being of "dumb-



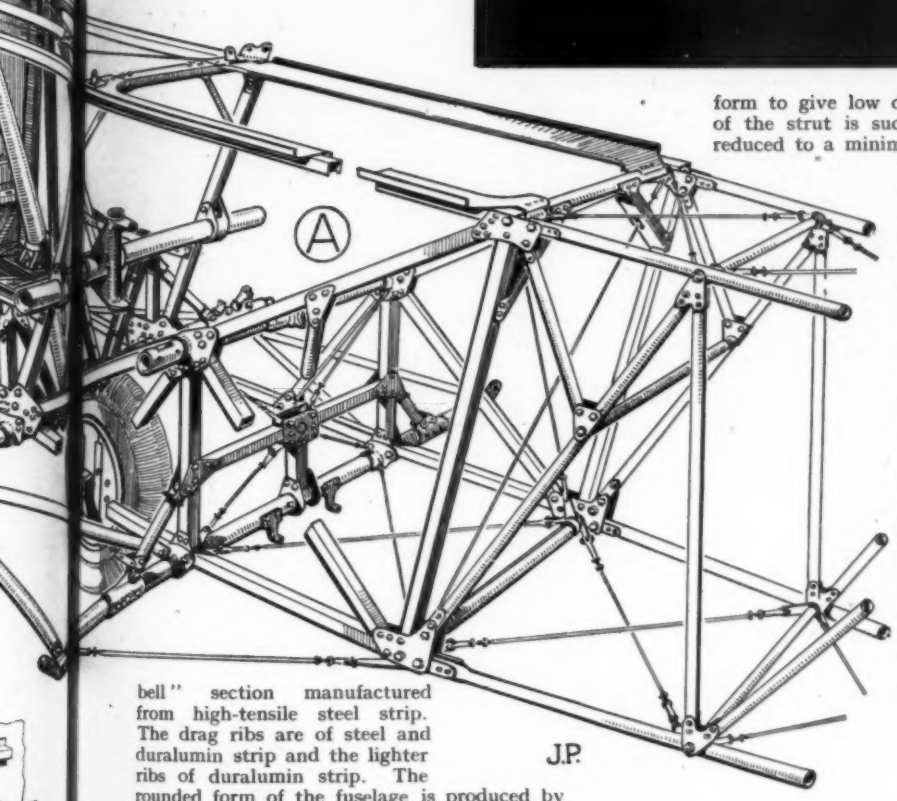
Most of the structural features of the Gladiator fuselage are shown in the sketch on the right. Circular-section tubes are used in the rear portion and square-section tubes in front. The lower wing roots are integral with the fuselage. The undercarriage struts are cantilevers tapering to each end; their attachment to the lower longeron is shown at a in the smaller sketch below.





The general wing construction is illustrated on the left, the sketch showing the port lower wing, with details of the spar, rib attachments and similar features. The dotted lines indicate the split flap in the "down" position.

The three-quarter rear view on the right shows the general appearance of the Gladiator (Bristol Mercury IX). The corresponding key diagram on the opposite page indicates the location of the structural details, which are explained by the other sketches on these two pages.



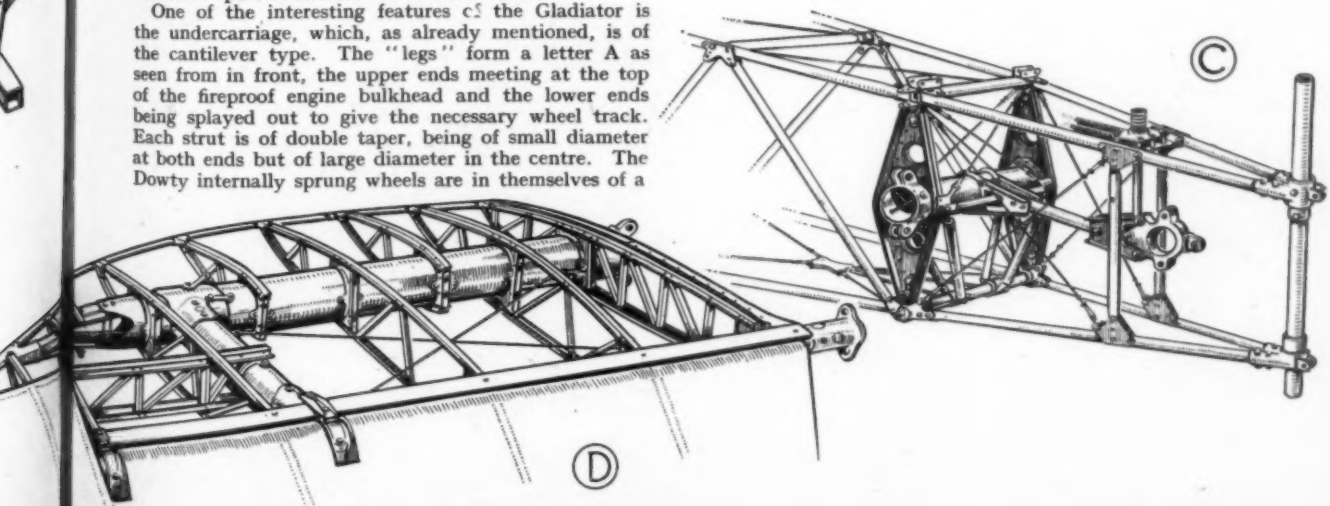
bell" section manufactured from high-tensile steel strip. The drag ribs are of steel and duralumin strip and the lighter ribs of duralumin strip. The rounded form of the fuselage is produced by a light secondary structure of light-metal formers and stringers, the latter being attached by a very neat stud-and-split-pin arrangement. The lower wing roots are built integral with the fuselage and have spars of circular-section steel tube.

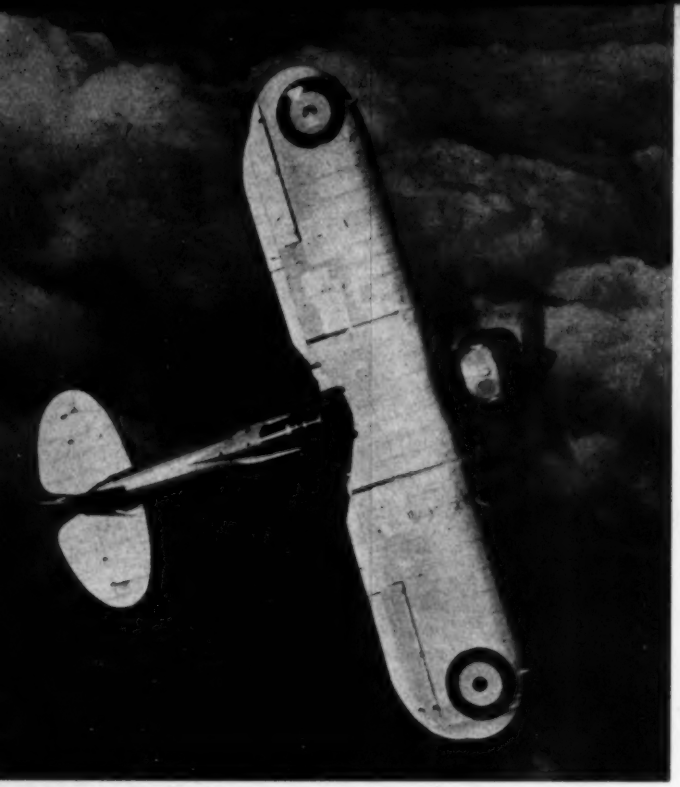
One of the interesting features of the Gladiator is the undercarriage, which, as already mentioned, is of the cantilever type. The "legs" form a letter A as seen from in front, the upper ends meeting at the top of the fireproof engine bulkhead and the lower ends being splayed out to give the necessary wheel track. Each strut is of double taper, being of small diameter at both ends but of large diameter in the centre. The Dowty internally sprung wheels are in themselves of a form to give low drag, and the shape of the lower end of the strut is such that interference drag is probably reduced to a minimum. That this type of undercarriage is strong was demonstrated when one of Gloster's test pilots had to make a hurried forced landing during a test flight. The machine ran through a couple of hedges and finished up on its nose, but the cantilever undercarriage was undamaged.

The biplane wing arrangement of the Gladiator is along orthodox lines, with single-bay bracing. Rigging is facilitated by having special fine-adjustment turnbuckles only at the lower ends of the streamline wires. One unusual feature is provided by the trailing-edge flaps, a modern touch not usually found on biplanes. These flaps are quite small and are fitted on both upper and lower wings. They serve to increase drag rather than to increase lift, although there is a difference in stalling speed of 3 m.p.h. between flaps-up and flaps-down minima, the actual figures being 59 m.p.h. and 53 m.p.h. respectively. For making landings at night, the advantage of being able to steepen the approach angle is obvious.

J.P.

The tailplane of the Gladiator is supported in the usual way by its front spar, and the rear spar is raised and lowered by the screw jack shown. The tailplane has tubular spars as shown in the sketch on the left below.





A plan view of the Gladiator is shown in this steeply banked turn above the clouds. Manoeuvrability is one of the attributes of the compact biplane and is combined with speed in this particular day-and-night fighter. (*Flight* photograph)

The flaps are operated by a hydraulic hand pump. An interesting wing detail is the use of strut-root cuffs made of Plastilume-moulded Celastoid.

The Bristol Mercury engine drives a wooden two-bladed airscrew in the standard production Gladiator, although one batch has been fitted experimentally with Fairey three-bladed metal airscrews. The main petrol tank is housed in the fuselage, just ahead of the pilot's feet, and has a capacity of 84 gallons. Normally, however, it contains only 70, which quantity gives the machine its range at normal load. As the Gladiator is stressed for an all-up weight of 4,750 lb. and the normal gross weight is only 4,640 lb., the extra fuel does not represent an overload. The oil tank is carried in the deck fairing, and a corrugated oil cooler forms a curved "mat" outside it.

Military equipment is, needless to say, very complete indeed, and includes full day-and-night-fighter gear, such as navigation lights, two-way wireless, oxygen bottle and cockpit heating. The armament consists of four machine guns (Vickers or Browning), two of which are carried in the side fairings of the fuselage and provided with interrupter gear, while the other two are carried in "blisters" in the lower wings. The wing guns are, of course, outside the airscrew disc, and so no interrupter gear is necessary.

Some of the performance figures of the Gladiator have already been quoted. It may be added that the maximum speed of 253 m.p.h. is attained at 14,500 ft. The climb to 15,000 ft. occupies but 6.25 minutes, and a height of 20,000 ft. is reached in 9 minutes. The Gloster Aircraft Co., Ltd., guarantees the weight and performance figures within narrow limits, viz., ±3 per cent. on speed and climb, and ±2 per cent. on weight. The tare weight, by the way, is 3,476 lb. The load factors built into the Gladiator are such as to permit the machine to be used for aerobatics and T.V. dives at full gross weight.

About Small Power Units

Small Four-Stroke Aero Engines, by C. F. Gaunter. (Aeronautical engineering series.) Sir Isaac Pitman and Sons, Ltd., London, W.C.2. 6s. net.

THOSE who are interested in light aircraft will find *Small Four-Stroke Aero Engines* a most useful little book. It is a companion to the author's *Small Two-Stroke Aero Engines*, published last July.

These two books are arranged roughly in three sections: (a) A brief review of light aircraft. (b) Details of construction and servicing of the various types of small engines. (c) Descriptions and photographs of all such engines produced at the present time.

A New Aluminium Solder

THE words "aluminium solder" are apt to revive unpleasant memories in the minds of many engineers on account of the number of attempts that have been made to produce a satisfactory alloy for jointing aluminium. Frequently exaggerated claims have been made with disappointing results, so that until recently the problem has remained virtually unsolved commercially. Quite recently, however, we have been able to witness tests of a new jointing material named "Alunize," which gives every indication of being suitable to making joints of high tensile strength as well as for filling blowholes or building up defects in castings of aluminium alloys. The actual tensile strength is 26 tons/sq. in., or roughly equal to that of duralumin, Hiduminium, etc., in the best heat-treated condition.

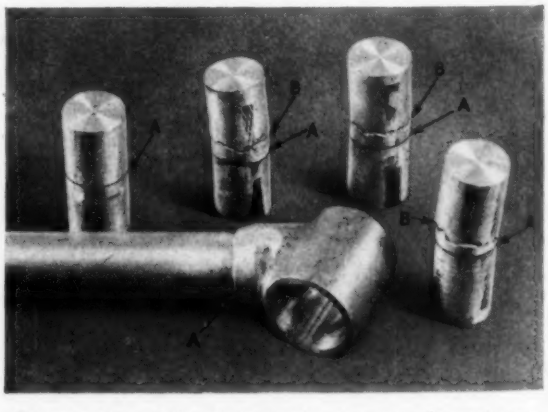
A variety of joints made with this material, some of which have been tested to destruction, are shown in the accompanying illustration, where it may be seen that butt joints between test-pieces of 1in. diameter aluminium bar stock have been fractured by bending at the points B, leaving the joints A intact. The illustration also shows a tube-and-socket joint made with a clearance of 0.005in. between the components, and under test similar joints show a fracture of the tube away from the joint when submitted either to tensile or bending stresses.

Originally this material was produced with a melting point of 220 deg. C., but it was found in practice that this temperature tended to weaken the metal adjacent to the joint, and new alloys have therefore been developed with melting points as low as 160 deg. C., which is well below the heat-treatment temperatures for duralumin and similar high-tensile materials. Since the properties of the alloy depend, however, on the preparation and heat-treatment of the metals rather than upon the constituents and analysis, it is desirable for reliable series production work to hold the working temperatures within reasonable limits, and it is recommended that a pyrometer be employed for this purpose. With attention to such details it is possible not only to join all alloys of the aluminium group, but also to deal with Elektron and other magnesium alloys.

In application, "Alunize" is comparatively simple to use, since no flux is required.

It is also claimed to be possible to make joints between aluminium and other non-ferrous metals, or even steel, by tinning the other parts with ordinary solder. When this has been effected any trace of flux is carefully removed and thereafter the joint is completed with "Alunize" without the use of any further fluxing medium.

The material is handled in this country by Alunize, Ltd., 34, North Street, Rugby.



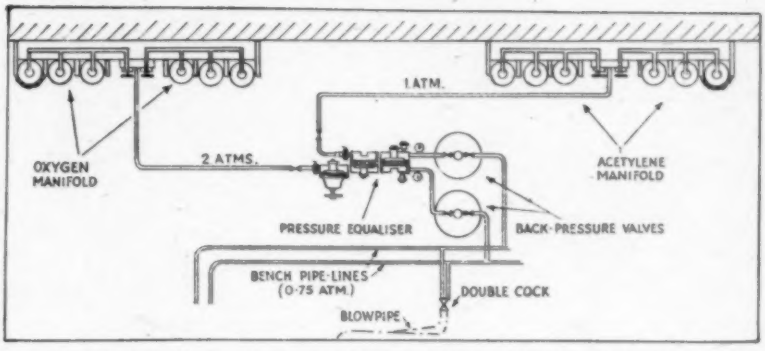
The test-pieces referred to in the accompanying note on "Alunize" aluminium solder.

HERE and THERE

Welding Well Done

AN outstanding feature of the "Frama" welding plants, made by C. H. Johnson and Sons, Ltd., is the inclusion of the maker's automatic regulating valve, by which the relative pressures of acetylene and oxygen are balanced automatically and independently of the operator's skill. This ensures an optimum blowpipe flame throughout the job, and avoids trouble with oxydisation (caused by an excessive oxygen supply), carbonisation (excessive acetylene), overheating of the blowpipe, and back-firing. A saving of no less than 10 per cent. of acetylene and 25 per cent. of oxygen is claimed.

With the orthodox hand-regulated mixture system constant flame adjustments have to be made, owing to counter-pressures created by the part to be welded and by heating of the gases in the head of the blowpipe. The "Frama" system makes all necessary corrections automatically and instantly.



Layout of a "Frama" central welding installation, showing the regulation of pressures.

Three main types of equipment are made, each including regulating units and blowpipes with a variety of nozzle fittings: One is for general welding (1/64in. to 1¼in.); one for welding and cutting (1/64in. to 1¼in. welding, and ⅜in. to 4in. cutting); and the third for fine welding (1/64in. to $\frac{5}{32}$in.).

Very special attention has been given to the assembly of central plants for works installation. The high-pressure type utilises cylinders in batteries; oxygen and acetylene are piped to a central regulating unit, passed through back-pressure valves, and thence led to the blowpipes *via* bench pipelines. The system is illustrated above.

In the low-pressure pattern acetylene is produced in a generator and compressed by a "Frama" rotary compressor, a regulating system ensuring that the maximum pressure of 9lb./sq. in. permitted by the Home Office is not exceeded. Thence the gases pass to the bench pipes *via* back-pressure valves as before. Particular operational economy is claimed for this system, and economical use of floor space is a feature of both methods.

Full details are obtainable from C. H. Johnson and Sons, Ltd., Smedley Road, Manchester, 8.

R.N.A.S. Old Comrades

IT is stated that the object of the recently formed Royal Naval Air Service Old Comrades' Association is to give all ranks an opportunity of renewing their comradeship of the past, and also to try to assist those who may require help by employment or other means.

The committee hopes that all those who served in, or were attached to, the Royal Naval Air Service (all branches) will send in their names, and those of any comrades of whom they may have knowledge, to the chairman, Mr. W. J. Salaman, The Brackens, Heather Walk, Edgware, Middlesex, so that they can be more fully acquainted with the objects and aims of the Association.

Forging Ahead

A RECENT visit to Thomas Smith's Stamping Works, Ltd., Coventry, showed this firm to be very busily occupied with important orders for a wide range of drop forgings for aircraft engines and aeroplanes generally, for delivery to practically all the principal aircraft manufacturers in the country.

The present range of manufacture includes master and auxiliary rods, cylinders, etc., as well as a variety of large and small parts in all the special steels and light alloys used for these purposes. Particular attention is devoted to the treatment, inspection and test of all aircraft parts.

New shops which have been found necessary to deal with the large volume of work and orders anticipated are now nearing completion and will be occupied in the course of a few months.

The subsidiary company in Lincoln, Smith-Clayton Forge, Ltd., specialises in the manufacture of crankshafts, and is exceptionally busy in this class of work for numerous important customers.

Death of Mr. J. A. Main

FLIGHT regrets to record the death of Mr. James A. Main, chairman of A. and J. Main and Co., the old-established structural engineers.

Bakelite Headquarters

THE correct address of Bakelite, Ltd., the well-known plastics specialists, is 68, Victoria Street, London, S.W.1, and not as inadvertently given in our Olympia B.I.F. report.

For Fitness

TO assist the national fitness campaign, the Anglo-American Oil Co., Ltd., have introduced a five-day week for all their head office staff. Also, members who are Territorials will have special leave on full pay.

Boulton Paul Aircraft Personalities

IT is announced that Mr. Herbert Strickland has been appointed managing director of Boulton Paul Aircraft, Ltd. Mr. J. D. North has been appointed chief engineer, retaining his seat on the board. Mr. S. W. Hiscocks has resigned his directorship and has retired from the company's service.

Jas. Booth's A.G.M.

THE accounts of James Booth and Co. (1915), Ltd., the well-known Birmingham alloy specialists, will be presented at the annual general meeting on March 11, when a sum of £34,312 will be recommended for payment of a 15 per cent. dividend on the Ordinary shares.

The directors also propose to offer to Ordinary shareholders 100,000 Ordinary shares at £1 per share in the proportion of one new Ordinary share for every three Ordinary shares now held.

Registering the Registration Board

SOME interesting details regarding the formation of the Air Registration Board as a limited company are now available. The Board, which was formed on the recommendation of the Gorell Committee to undertake the licensing and registration of all types of aircraft up to ten-seaters, consists of fourteen members representing various interests. Their names were given on page 58 of *Flight* of January 21.

According to the particulars filed at Somerset House, the Board was registered on February 26 as a company limited by guarantee without share capital. Each member is liable for £1 in the event of winding up. The word "Limited" is omitted from the title by licence of the Board of Trade. The income and property of the Board are to be applied solely towards the promotion of its objects. The objects are "to carry out such administrative and advisory functions with respect to the design, construction and maintenance of aircraft and matters connected therewith as may from time to time be delegated to the Board by the Secretary of State for Air, and to charge receive and retain such fees as may by law be payable in respect thereof; to survey and inspect the con-

struction of aircraft, and of engines, components and equipment; to certify the same, and to certify and approve the constructors thereof; to examine and certify persons employed in the design, construction or repair of aircraft and of engines, components and equipment of aircraft, or in the maintenance or operation of the same; to make recommendations for the issue of certificates of the airworthiness of aircraft; to survey and report on aircraft for the information of insurers and others; to classify and register aircraft and publish particulars thereof, etc."

E. G. Brown's Progress

AT the statutory meeting of E. G. Brown and Co., Ltd., of Northumberland Park, London, N.17, it was stated by Mr. Edwin George Brown that the firm had more orders on its books than at any time in its 25 years' history.

In January, 1936, possession had been taken of their new aircraft works, covering 16,000 sq. ft., which had been equipped with the latest plant for this particular work.

An additional 15,000 sq. ft. was being devoted to the manufacture of special lightweight motor bodies, of their own design, to an Air Ministry specification.

E. G. Brown and Co. undertake numerous forms of aircraft presswork among which fuel tanks are a speciality.

Aircraft Manufacture and Maintenance

TO be completed in about thirty-two weekly parts, *Aero Engineering*, edited by Sqdn. Ldr. H. Nelson, M.B.E., A.M.I.Mar.E., is being published by George Newnes, Ltd. The series will cover the production, assembly, testing and maintenance of aircraft, and the first number, which will be on sale at 1s. next Wednesday, gives a good idea of the general aim of the work. It contains articles on Essential Requirements of Modern Aircraft, A Short Survey of Aircraft Production and Maintenance and Overhaul of the Gipsy Major; there is also a data sheet on the Singapore III.

Very fully illustrated with photographs and sketches, *Aero Engineering* should be of considerable assistance to works operatives ground engineers, R.A.F. mechanics and others.

Aircraft Companies and Unit Trusts

A CONSIDERABLE increase in the number of investors with interests in the motor and aircraft industries is indicated in a survey of unit trust development now being made by the Unit Trusts Association. The survey shows that securities belonging to more than forty motor and aviation companies have been selected for inclusion in the Unit Trusts' portfolios of member companies in the Association.

Among the aircraft companies, the Fairey Aviation Co., Ltd., appears most frequently in the portfolios of securities, closely followed by other well-known firms such as the Bristol Aeroplane Co., Ltd.; the De Havilland Aircraft Co., Ltd.; Handley-Page, Ltd.; Hawker-Siddeley Aircraft Co., Ltd.; and Short Bros. (Rochester and Bedford), Ltd.

Details are obtainable, from the Trusts' information bureau at Salisbury Square House, Fleet Street, London, E.C.4.

Dynamometry

AN interesting new transmission dynamometer was described by Mr. N. S. Muir, of the Royal Aircraft Establishment, Farnborough, in his lecture to the R.Ae.S. last Thursday. The new dynamometer serves to measure the torque transmitted from the engine to the airscrew, and consists of a spring element inserted in the drive. The deflection of the spring under the transmitted torque is measured by an electrical system developed at the R.A.E. from the basic principle of Ford's torsiometer. Fundamentally it consists of a set of electrical transformers the primaries of which are energised by an A.C. generator, the variation of air gaps in the iron cores being used to provide a variation of secondary output voltage, which is arranged to be proportional to the change of air gap. The deflection of the spring element in the dynamometer is arranged to vary the air gap a like amount, and therefore the output voltage is a measure of the torque.

The known null reading method is employed, whereby the output from the dynamometer is balanced by an equal and opposite output from a similar set of transformers, the air gaps of which are varied by a hand micrometer mechanism. When the outputs are in electrical balance, the reading on the scale of the hand micrometer mechanism is a measure of the mean deflection of the spring and therefore of the mean torque.

The apparatus has been developed at the R.A.E. and one torque meter is now in use in flight on an engine power investigation, while another is in use in the 24ft. wind tunnel, for which it was specially designed as a piece of research equipment. In the paper Mr. Muir gave some typical results obtained in flight on a radial engine.

Small-size Metal Construction

THE Students' Section of the R.Ae.S. listened recently to a very interesting lecture by Mr. J. I. Waddington on metal construction applied to a small aeroplane. Mr. Waddington took as an example C-W Aircraft's Cygnet, and explained very clearly, and in considerable detail, not only the problems involved but the particular methods employed in solving them. Thus the lecture proved a description of the Cygnet as well as the reasons why the different components were constructed in any particular manner. Mr. Waddington came to the conclusion that machines of a gross weight of 1,300 to 1,500 lb. were about the smallest it would be practicable to build in stressed-skin construction.

Something New in Plugs

AFTER considerable experiment by the K.L.G. Company, a new type of aero plug with six platinum/iridium wire earth points of 0.020in. in diameter and $\frac{1}{8}$in. in length radially arranged over a flat-headed electrode, has proved to be very successful. Several important advantages are now claimed for this new design as a result of practical tests.

The business end of the new K.L.G. plug with its six platinum-iridium earth points.

Bench tests with single-cylinder units running at high duty up to 200 B.M.E.P. and complete engine tests under type test conditions show that this plug is capable of completing the 100 hours without cleaning or resetting of gaps. It is probable, therefore, that double this time could elapse between reconditioning under normal flying conditions at cruising power.

Oiling-up troubles, particularly in the lower cylinders of radial air-cooled engines, into which oil tends to drain, seem to be resisted to a greater extent by the new design.

There are two advantages to be gained from the low voltage characteristics of platinum/iridium wire. A comparatively small current will produce a spark, due to the low resistance of the wire, and this means that even though the insulation of the plug may become fouled by carbon, lead or surplus oil, the resistance of the points is still so low that a spark will pass more readily there than elsewhere.

The auto-ignition temperature for a plug is normally about 700 deg. C., but in this case is stated to be raised to as high as 1,000 deg. C.

Platinum/iridium shows a low degree of erosion and it is for this reason that cleaning and resetting is required less frequently. In any case, however, no special tools are needed to adjust clearances in thin wire earth points, and it is stated that there is no risk of their becoming loose in the plug body.

The 18 mm. plug type number is V.7/4, or with ball-ended terminal V.7/4-B. Short-reach 12 mm. models are available with or without ball-end, V.6/4-B. and V.6/4 respectively. Integrally screened versions are manufactured and progress is being made with a 14 mm. model.

No Hot Spots

AN interesting pamphlet dealing with the Cross rotary valve has been printed. The valve is explained and illustrated in a simple manner, and the complete results obtained from an engine using it show a high degree of efficiency. The makers are Cross Rotary Valve Patents, 33, Midford Road, Combe Down, Bath.

Cellactite Building Materials

IT should be noted that Cellactite and British Uralite, Ltd., who are makers of roofing, roof ventilators, flue pipes, cowls, etc., while supplying enamelled "Urastone" to match coloured appliances do not supply paints or enamels separately, as was, perhaps, inferred in a recent paragraph.

A general view of the assembled machines at Almaza. Note the big Junkers Ju.86.

ROUND the OASES

Opening Stages of the Egyptian Royal Aero Club's Meeting Described by One on the Spot : Nine British Participants

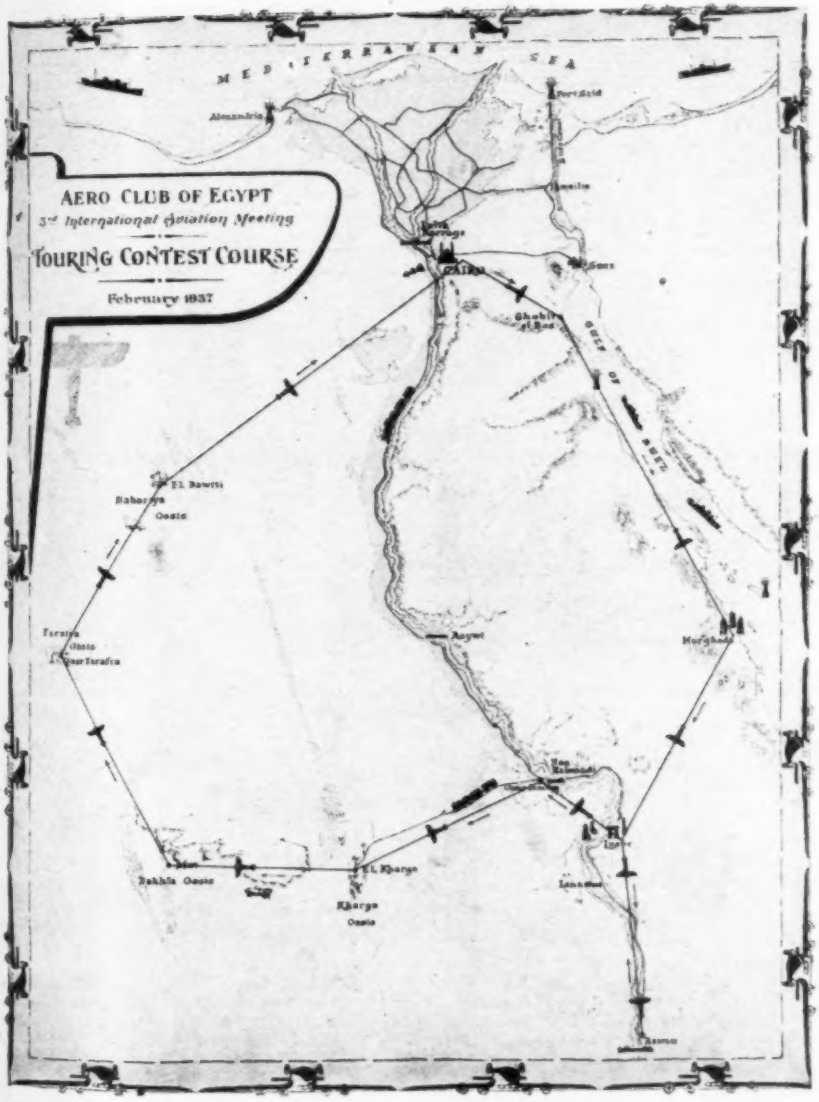
Cairo, Tuesday, February 23.

FORTY-ONE competitors started this morning on the Circuit of the Oases, and that in itself is an eloquent testimony to the high standard of the organisation of the Royal Aero Club of Egypt. Only two are left behind, one on account of some hitch over insurance and the other with mechanical trouble.

The weather is now perfect and there is every promise that the next four days will pass off as happily for every one concerned as did the start this morning.

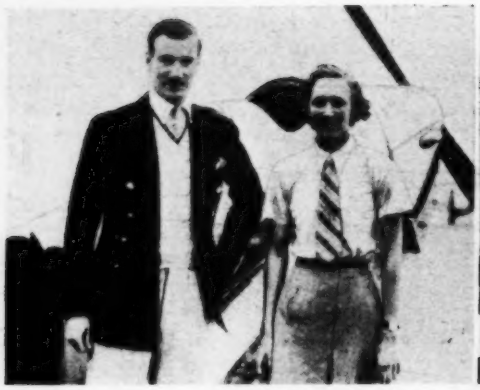
First Arrivals

The first arrivals reached Almaza Aerodrome on Friday of last week, and since then the aerodrome has worn a very gay appearance. A large aircraft park is laid out on the north side of the big hangar and between the hangar and Misr Airwork clubhouse a reception tent has been put up. On the following page is a list of the competitors who started on the Oases Circuit :—



AERO CLUB OF EGYPT
3rd International Aviation Meeting
TOURING CONTEST COURSE
February 1937

This picturesque map, prepared in colours in Egypt, gives a good idea of the Oases Circuit. It is not, of course, the flying map issued to competitors.



Five of the British participants. (Left to right) Lt. V. A. P. Budge, Miss Hooper, Mrs. J. C. Hargreaves, Major Hargreaves and Mr. Deakin.

Austria (1).—Otto Mendl (Messerschmitt 108).
Belgium (1).—J. M. Provost (Leopard Moth).
Czechoslovakia (4).—Kutloch (Baby Okypn), Zlinska Letecka A.S. (Ambrus) (Zlin XII), Zlinska Letecka A.S. (Fukfu) (Zlin XII), Aeroklub de Tchecoslovique (Benes-Marz) (BE 31).
Egypt (5).—Ahmed Salem (Leopard Moth), Mlle. Lotfia el Nadi (Hornet Moth), Prince Omar Halim (Miles Hawk Major), Prince Abbas Halim (Waco C6), A. Nagi (Avro 641).
England (9).—F. C. J. Butler (Hornet Moth), E. D. Spratt (Miles Falcon), Major J. C. Hargreaves (B.A. Eagle), V. A. P. Budge (Miles Hawk Major), Capt. J. K. Mathew (Miles Hawk Major), Ft. Lt. J. Heber Percy (Puss Moth), P. G. Aldrich-Blake (Percival Vega Gull), Misses M. and S. Glass (D.H. Moth), Miss Lily Dillon (B.A. Swallow).
France (11).—H. Lumiere (Caudron 635), G. Morizot (Caudron Aiglon), H. Engernich (Leopard Moth), E. Wattine (Caudron 635), A. Masset (Caudron Aiglon), Mme G. le Pelley du Manoir (Caudron Aiglon), De Chateaubrun (Percival Vega Gull), Marquis de Saurez D'Aulun (Caudron Aiglon), Hirsch Ollendorf (Vega Gull), Guy Hansez (Caudron Simoun), A. Boulenger (Farman 403).
Germany (4).—Otto R. Thomsen (B.F.W. Me 108b), President von Gronau (B.F.W. 108b), Freih Speck von Sternburg (Junkers Ju.86), Karl Schwabe (Klemm Kl 32a).
Poland (1).—J. Drzewiecki (R.W.D. 13).
Rumania (1).—Prince Bibesco (Potez).
Syria (1).—B. Gagey (Farman 402).
Italy (3).—G. Zapetta (F.N.305), V. Biani (Ghibi), S. Santini (Ghibi).

There are, of course, two events: First, the Circuit of the Oases—in no way a speed contest—and, finally, the Speed Race.

It is, perhaps, interesting to record the formulæ on which marks are awarded for the Circuit of the Oases:—

$$N = 100\left(6\frac{v}{V} + 12\frac{P}{p} + 4\frac{d}{D} + \frac{C}{20}\right)$$

where

N = Total number of marks obtained by a competitor.
V = Fastest speed of any competitor over the course.
v = Actual speed of the competitor over the course.
P = Lowest petrol consumption per passenger mile of any competitor.
p = Actual petrol consumption per passenger mile of the competitor.
D = Greatest range under condition of flight of any competitor.
d = Actual range under condition of flight of the competitor.
C = The number of marks awarded by judges on matters that are constant. The following are the points which will be taken into consideration and the scale on which marks will be awarded.

	Points.
(a) Provision for carriage of luggage	20
(b) Comfort (e.g., silence, view, seating, etc.)	20
(c) Method of starting engine	20
(d) Accessibility for routine maintenance of engine and aircraft	25
(e) Aerodynamic and other safety devices	20
(f) Safety provision for passengers and crew	10
(g) Arrangements of controls and instruments	10
(h) Equipment for night flying	10
(i) Accessibility for refuelling	10
(j) Provisions for picketing	10

The speed competition carries no handicap and is open to all aircraft which complete the Oases Circuit. It consists of three of a 104-mile triangular course from Almaza.

During the six days the competitors are in Egypt, they are the guests of the Royal Aero Club. Yesterday evening, February 22, H. E. Mohamed Taher Pasha gave a cocktail party at Heliopolis Palace Hotel to the competitors in the Rally and to people conected with aviation in Egypt.

The aircraft park during the last two days has excited a lot of interest. From the point of view of private owners, the Messerschmitt and the Vega Gull are perhaps outstanding. As regards the larger machines, the Junkers 86 with two Diesel motors is the centre of attention. Oddly enough, a second Junkers 86 arrived yesterday and took off this morning for Teheran and Kabul.

One of the Italian entries, the F.N. 305, is a very neat affair and is expected to prove one of the fastest machines in the Rally if she shows her paces in the speed race.

The Oases Circuit

The programme of the Oases Circuit might be mentioned briefly: The take-off this morning, February 23, was at 1½-minute intervals from 07.00 hours, and competitors are due to reach Assuan to-day, travelling down the west side of the Gulf of Suez with turning points at Hurgada and Luxor—about 500 miles. The whole of to-morrow morning is spent at Assuan sight-seeing and departure is at 14.00 hours straight down the river to Luxor, about 110 miles.

The whole of Thursday, the 25th, is spent at Luxor sight-seeing and the flying restarts at 05.45 hours on Friday the 26th. This is a strenuous day round the Oases in the Western Desert, Kharga, Dakhla, Farafra, Baharia to Almaza. The distance is about 680 miles.

Before ending this preliminary note mention must be made of the excellence of the organisation. The Royal Aero Club of Egypt, and in particular of the President H. E. Mohamed Taher Pasha and the secretary, Dr. M. A. Zahra, both of whom have been indefatigable in their efforts to make the meeting a success, are to be warmly congratulated. To get over forty aircraft of eleven different nationalities serviced and started without a hitch is no mean undertaking. The map with which all competitors have been supplied is probably one of the best of its kind produced for such a race. The route instructions and information given are clear and complete to the smallest detail.

[*Since the above was received, the result of the speed race has become known. Our correspondent's anticipation was well founded, for the Italian F.N. 305 proved the winner. M. Guy Hansez was second and the only British competitor, Mr. S. B. Cliff, retired.*—ED.]

R.A.F. AERODROME SITES and THEIR COST

SIR VICTOR WARRENDER, in a written answer to Mr. Thomas Williams, stated last week that the number of separate sites for new Royal Air Force aerodromes and aeroplane factories of which the purchase has been completed during the past two years is 25. The acreage of the sites and the total cost of each are as follows (the cost includes in a number of cases compensation, purchase of houses, etc.):—

Harwell, 220 acres, £11,650; Cranfield, 413, £17,500; Feltwell, 383, £19,500; Marham, 499, £8,650; Stradishall, 375, £7,600; Church Fenton, 255, £26,500; Thorney Island, 1,450, £78,500; Odiham, 216, £9,000; Montrose, 208, £18,600; Debden, 245, £14,900; Upwood, 570, £23,500; Wyton, 409, £16,200; Scampton, 410, £25,000; Hemswell, 443, £25,500; Dishforth, 455, £26,000; Driffield, 407, £15,230; Leconfield, 498, £23,750; Ternhill, 406, £32,900; Hullavington, 479, £14,300; West Freugh and Luce Bay, 2,700, £19,400; Penrhos and Hell's Mouth, 609, £21,500; Manby, 275, £8,800; Theddlethorpe, 165, £7,250; Welbourne, 108, £3,600.

Factory Site.—Birmingham, 17½ acres, £10,500.

In a written answer to Major Sir Ralph Glyn, Sir Victor Warrender states that negotiations are proceeding for the acquisition of about 460 acres of land for a Royal Air Force aerodrome near Benson, Oxfordshire.

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

AUSTRALIA AND THE MAILS

MR. LYONS' recent statement announcing the agreement with Great Britain for a twice-weekly service by flying boat raises an interesting point. Mr. Lyons stated: "The Commonwealth feels, however, it would not be justified in abolishing the surcharge unless it does the same for internal mails, and this will require expenditure so great that it would prejudice the further development of the internal services."

Are not the internal services being prejudiced by the decision of the Federal Government to continue to control the Singapore-Brisbane section of the U.K.-Australia air route?

With her huge area and small population, would not it have been wiser to allow Imperial Airways to manage this sector, make a small contribution by way of subsidy, and, with the money saved, abolish internal and external mail surcharges?

W. L. NAYLOR.

London, W.9.

THOSE WIRELESS OPERATORS

YOUR correspondent Mr. W. H. Hamblin (February 18) writes a pretty letter, but suffers from the delusion that a higher standard of air wireless operating is called for.

In this he is all wrong, for more education and skill would probably only render the average W/O. a greater menace than he is already, and I shudder to think of pilots losing themselves really scientifically, aided and abetted by the W/O.-cum-navigator.

Raising his standard might also give him ideas that he is worth more than his present £4 10s. a week and, for another thing, a highly skilled, responsible man might not favour the idea of carrying the pilot's bag.

The present scheme of employing hairless lads fresh from the wireless schools and then bunging them out into QBI seems quite the easiest and obvious method of killing birds by dropping a brick. Not only does this offer a sporting chance of disposing of obsolete aircraft without financial loss, but at the same time keeps pilots and Control tuned to concert pitch and prepared for anything.

Why change a procedure that has stood the test of time and appears to satisfy all concerned, undertakers and underwriters included? The latter don't usually suffer in silence, and if they had any kick coming they would have by now (as they do to shipping firms) offered a reduction of premium on aircraft fitted with reliable radio and D/F., and carrying a man who can efficiently use such gear.

EX-MARINE.

Croydon.

MASS CONSUMPTION

I DO not wish to occupy valuable space with a personal matter, but I do feel that I must reply to Mr. H. R. Dimock's attack caused by my recent letter in *Flight*, in case anyone else has gone away with the wrong idea.

Had he read my letter a little more carefully and refrained from jumping to conclusions before rushing into print his letter would never have been written. Or perhaps he does not understand the meaning of the word "impecunious."

First of all, to remove the foundations of his argument. I am not the owner of (as he states) a "posh car"; my existing vehicle is third-hand! Nor was I able to afford "the necessary cash for expensive tuition"; I learned to fly because it was regarded as a commercial proposition that I should. The only flying that I have been able to do at my own expense has been an odd hour here and there when I have felt sufficiently wealthy to afford such luxury. But I have not let this warp my sense of proportion.

I do not deny that pilots can very quickly be taught to fly round aerodromes in ultra-light machines. Unfortunately it is a fact that a pilot so trained will take practically as long to become a useful and safe commercial or service pilot as one starting *ab initio*, both starting on genuine training types at the same time. This is because the former has to unlearn a lot of habits gained on the ultra-light. For advanced training, a machine which is overstable and nearly flies itself leaves much to be desired, because the pupil will develop bad habits of which the machine does not warn him; and if there is no instructor he goes on doing them not knowing any better. These faults cannot always be seen from the ground, and when he gets on to a larger machine the crash comes. Mr. Dimock admits this when he states that his ultra-light pilots "have a complete indifference to engine failure." Perhaps he regards the ultimate criterion of flying as having innumerable swarms of these aircraft flying round aerodromes in small circles!

In a country such as ours, where the winds at operational heights are, more often than not, over 30 m.p.h., an aircraft with a cruising speed of 60-70 m.p.h. is useless for serious work. However, I would be the first to admit that they make most amusing toys.

My original letter was directed against the half-trained pilot who endangers the lives of others. May I quote from Major Richards' excellent little book on Aerodrome Management:—"Practically the big risk remaining in civil aviation to-day is that of collision, and anything you . . . can do to minimise that risk must be done. Remember that a Moth, through disobeying the regulations, particularly in 'Q.B.I.' conditions, can wreck an airliner and kill some forty people."

Mr Dimock's attitude seems to be similar to that which, I regret to say is so prevalent among cyclists, i.e., "We have as much right to the road as the motorists." Would he, when in a rowing boat in the Solent, expect the Queen Mary or the Nelson to make sundry alterations of course to avoid him? I rather think he would be greeted with four short blasts which mean "keep out of my way—I cannot keep out of yours." It is a pity that the rules of the road at sea cannot be applied as stringently to the roads and the air.

I do not wish to deprive the owner of the cheap car or aircraft of his pleasure as long as he takes it in a way that does not endanger the lives of those who use the road and air "on their lawful occasions." I was trying to point out that we should consider the lesson taught us by the roads: That an enormous influx of cheap vehicles, while providing employment for many, has also caused an alarming increase in the accident figures. I am confident that this increase is not due solely to the increase in numbers but largely to inexperience and lack of imagination.

Might I suggest that Mr. Dimock reads my first letter again? I regret that I must use a *nom de plume*.

HEADLIGHT.

Kent.

THE PRIVATE OWNER AND QBI

AS you are probably aware the International Chamber of Commerce recently published a special Commercial Aviation Number of *World Trade*. This contained several articles, written by prominent aviation personalities.

I am picking out from these one paragraph, which, after dealing with the speeds of two aircraft approaching one another and the time allowed for pilots' reactions, reads:—

"It is not, therefore, sufficient for aircraft not equipped with radio to keep constant watch when flying on a regular airway in bad visibility. *Privately owned aircraft should not be allowed to enter the zone in which commercial services are operated.*"

Does the writer really mean what he says? Did he pause for one second to think on the effect of bringing about his suggestion?

Let me say, here and now, that I am far more interested, directly, in the safety of commercial aviation than in the private owner movement. However, no one should make rash and sweeping statements which are likely to hinder rather than further the interests of both.

Privately owned aircraft are not allowed, without two-way radio, to fly in the controlled zones in bad visibility. Debar them from doing so, even in good weather, and you will debar them from ever going abroad, from the chief and most valuable incentive for using their craft, from getting to half the seaside resorts to which so many now fly in the summer; in fact, the private owner movement in this country would cease. The majority of those owners who reside in Kent, Surrey and Sussex would be forbidden even to take off!

Led by the invaluable example of the Hon. F. Guest, Sir Philip Sassoon, and Mr. Nigel Norman, among others, the private owner movement has been one of the mainstays of the R.A.F. Reserve. Surely, this alone is sufficient to encourage the movement and to fight all movements to curtail it.

Let us all think again, and that impartially.

London, S.W.1. MUSKETEER.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

PRINCIPAL AIR AIDE-DE-CAMP TO THE KING

The Air Ministry announces the appointment of Air Chief Marshal Sir Hugh Caswall Tremenheere Dowding, K.C.B., C.M.G., Air Officer Commanding-in-Chief, Fighter Command, as Principal Air Aide-de-Camp to the King in succession to Air Chief Marshal Sir Robert Brooke-Popham, G.C.V.O., K.C.B., C.M.G., D.S.O., A.F.C., Inspector General of the Royal Air Force.

Air Marshal Sir Cyril Newall, K.C.B., C.M.G., C.B.E., A.M.
(*Flight* photograph.)

NEW CHIEF OF THE AIR STAFF

The Air Ministry announces that His Majesty the King, on the recommendation of Viscount Swinton, Secretary of State for Air, has been pleased to approve the following appointments, to take effect from September 1, 1937:—

Marshal of the Royal Air Force Sir Edward Leonard Ellington, G.C.B., C.M.G., C.B.E., Chief of the Air Staff, to be Inspector General of the Royal Air Force.

Air Marshal Sir Cyril Louis Norton Newall, K.C.B., C.M.G., C.B.E., A.M., to be Chief of the Air Staff, in succession to Marshal of the Royal Air Force Sir Edward Leonard Ellington, G.C.B., C.M.G., C.B.E.

The following appointments are also announced:—

Air Vice-Marshal William Gore Sutherland Mitchell, C.B., C.B.E. D.S.O. M.C., A.F.C., to be Air Member for Personnel on the Air Council with effect from a date in July, 1937, vice Air Marshal Sir Frederick W. Bowhill, K.C.B., C.M.G., D.S.O.

Air Vice-Marshal William Lawrie Welsh, C.B., D.S.C., A.F.C., to be Air Member for Supply and Organisation on the Air Council, in the autumn of 1937, vice Air Marshal Sir Cyril Louis Norton Newall, K.C.B., C.M.G., C.B.E., A.M.

Air Marshal Sir Cyril L. N. Newall was born in India in 1886 and was educated at Bedford School and the Royal Military Academy, Sandhurst. He entered the Army in 1905 as Second Lieutenant, Royal Warwickshire Regiment and took part in the operations in the Zakka Khel country on the North West Frontier in 1908. In 1909 he transferred to the Indian Army (K.E.O. Gurkha Rifles), being subsequently promoted Captain in that regiment.

During leave in England in 1911 he graduated as a pilot, his Royal Aero Club certificate being 144 of October 3, 1911. He was one of the first officers to be selected by the Indian Army to have special instruction in flying at the Central Flying School at Upavon, and was a member of the 3rd Course in 1913. On his return to India he was engaged in the formation of a Central Flying School until on the outbreak of the war in 1914 he joined the Royal Flying Corps in England as a Flight Commander, serving with No. 1 Squadron. In 1915 he formed No. 12 Squadron and later commanded it in France. In 1916 he was appointed to command No. 9 Wing at home and later the same year became Commanding Officer of No. 9 Wing in France. In 1917 Sir Cyril Newall was appointed to command the 41st (Bombing) Wing which was formed near Nancy in order to carry out, on the instructions of the Government, bombing operations against German objectives as a counter-offensive to the air raids on London. This wing was the forerunner of the Independent Air Force which was created in 1918 and in which Air Marshal Newall commanded the 8th Brigade.

In addition to being awarded the Albert Medal for conspicuous gallantry in January, 1916, Air Marshal Newall received the C.M.G. and C.B.E., and was mentioned in despatches on three occasions. He also had several foreign decorations conferred on him. He was granted a permanent commission in the Royal Air Force with the rank of Wing Commander in 1919, on resigning his commission in the Indian Army.

After the War, Air Marshal Newall served as Chief Staff Officer, South Eastern Area, and also held the post of Deputy Director of Personnel, Air Ministry. He was Air Aide-de-Camp to His Majesty King George V during 1923-24, and after promotion to the rank of Air Commodore in January, 1925, was appointed Air Officer Commanding, Headquarters, Special Reserve and Auxiliary Air Force. Subsequently he was employed on special duty with the League of Nations Disarmament Committee, and on completion of this duty became Director of Operations and Intelligence, Air Ministry, and Deputy Chief of the Air Staff in April, 1926. He was appointed a Companion of the Order of the Bath in the Birthday Honours List, 1929, and in the New Year Honours List, 1930, was promoted to the rank of Air Vice-Marshal and made an additional member of the Air Council.

In February, 1931, he was appointed Air Officer Commanding, Wessex Bombing Area, Air Defence of Great Britain, and in October of the same year he became Air Officer Commanding, Royal Air Force, Middle East. On return to England he was again appointed to the Air Council, in January, 1935, as Air Member for Supply and Organisation and later the same year he was appointed a Knight Commander of the Order of the Bath, and was promoted to the rank of Air Marshal.

Air Vice-Marshal W. G. S. Mitchell was born in New South Wales in 1888 and entered the Army in 1906 as a 2nd Lieutenant, serving with the Devons and Highland Light Infantry. He qualified as a pilot in May, 1913, his Royal Aero Club certificate being No. 483. He was seconded to the Royal Flying Corps in December, 1913, and served in France from August, 1914, with short intervals until June, 1918, and for his services he received the D.S.O., M.C., and A.F.C., besides being mentioned in despatches on four occasions. He was given a permanent commission in the Royal Air Force with the rank of Wing Commander in August, 1919, on resigning his commission in the Army. In December of that year he was posted to India and on his return commanded the School of Technical Training, Halton, from January, 1925, to February, 1928. He then proceeded overseas to take charge of the Aden Command, which post he relinquished on appointment in 1929 as Director of Training at the Air Ministry. In January, 1933, he was appointed Air Officer Commanding, Cranwell, and Commandant of the Royal Air Force College, and in December, 1934, he became Air Officer Commanding, British Forces in Iraq.

Air Vice-Marshal Mitchell received the C.B.E. in 1924 for valuable services rendered in the field in connection with military operations in Waziristan, 1922-1923, and, in 1935, he was awarded the C.B. He was promoted to Group Captain in 1924, to Air Commodore in 1929, and to his present rank in July, 1933.

Air Vice-Marshal W. L. Welsh was born in 1891 at Biggleswade and joined the Royal Naval Air Service from the Royal Naval Reserve in November, 1914. He qualified as a pilot in the following month, and served on aircraft carriers and in France. He transferred to the Royal Air Force in 1918, being granted a permanent commission with the rank of Squadron Leader in the following year.

For his services in France he received the Distinguished Service Cross and a mention in despatches. He also received a French and a Belgian decoration. In 1919, he commanded a squadron with

the Army on the Rhine and also served in Egypt, Palestine and the Mediterranean, and was awarded the A.F.C. in 1920 for gallant and distinguished services. His subsequent appointments at home include air staff duties at No. 1 Group Headquarters and at the Air Ministry with a period intervening during which he was in command of the Station Headquarters at Kenley. In 1931 he was appointed to command No. 203 (Flying Boat) Squadron in Iraq. After his return to England he became Director of Organisation and Staff Duties in 1934, and in 1935 he was appointed Director of Organisation, and was awarded the C.B. in the New Year Honours List, 1937. He was promoted to Wing Commander in 1922, to Group Captain in 1930, to Air Commodore in 1934, and to his present rank in January, 1937.

ANOTHER FIGHTER SQUADRON

No. 72 (Fighter) Squadron formed at Tangmere on February 22 and has been placed in the Fighter Command, in No. 11 (Fighter) Group.

LECTURES ON AIR POWER

Air Vice-Marshal Gossage is lecturing on Thursdays at 5.30 p.m. in the New Buildings of the University of London. The remaining two lectures of the course will deal with air power in naval and military operations, with home defence, and with Empire defence.

ROYAL AIR FORCE GAZETTE

London Gazette, February 23, 1937

General Duties Branch

Air Chief Marshal Sir H. C. T. Dowding, K.C.B., C.M.G., is appointed Principal Aide-de-Camp to the King (February 22) (vice Air Chief Marshal Sir R. Brooke-Popham, G.C.V.O., K.C.B., C.M.G., D.S.O., A.F.C.). Flt. Cadet D. Weston Burt, having successfully passed through the Royal Air Force College, Cranwell, is granted a permanent commission as Pilot Officer with effect from and with seniority of December 19, 1936. (Substituted for the notification in the *Gazette* of January 20); Lt. N. S. Luard, R.N., is reattached to the Royal Air Force as a Flight Lieutenant with effect from February 8 and with seniority of July 1, 1934; Pilot Officer on probation F. F. Rainsford is confirmed in his appointment (January 20).

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—G. T. B. Clayton, R. H. G. Grey (January 9); J. S. Adams, A. S. B. Blomfield, A. T. B. Campling, W. C. S. A. G. Cooper, D. R. Hopper, B. P. Jones, F. D. D. Jones, W. G. Oldbury, P. E. Tockington-Leech, R. A. Barton, T. D. B. Blake, A. O. Bridgman, P. M. Brothers, J. A. Coltart, L. S. Dawson, E. C. S. Fewtrell, G. R. Fielder, L. G. Hamer, G. Harris, E. A. Keegan, C. J. C. Lee, R. L. Lorimer, S. T. Meares, D. R. Miller, J. P. S. Packer, A. W. Pennington-Legh, K. J. Powell, H. à'B. Russell, A. S. K. Scarf, W. T. C. Seale, H. L. Smeddle, R. D. Speare, J. D. Stern, J. R. Sullivan, J. G. Theilmann, J. P. Wells (January 27); J. A. W. Lawrence (January 30); P. G. Chapman, P. F. R. Vaillant (February 3); T. F. T. Chambers, J. H. McMichael (February 10); L. M. Blome-Jones, F. L. Chadwick, P. J. Emerton, D. L. England, J. W. S. Fowler, J. F. Grey, J. M. Holden, J. P. Hopkins, D. P. Hughes, F. A. Ives, L. V. James, P. N. Jennings, R. A. L. Knight, A. R. Pruddah, M. P. Richards, F. O. Thresher, F. W. S. Turner, P. F. Webster, M. L. Wells (February 17).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—G. N. Hancock, C. T. Weir, H. R. Tidd (January 15); R. H. Young, C. F. S. Fraser (February 12).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—G. L. Cruickshanks (January 12); E. R. Berrill (January 16); A. J. Mason, G. E. Wallace, A. W. J. Clark, J. D. Melvin, J. W. Bayley, A. W. D. Miller, D. W. Balden, P. W. Townsend, F. E. Croce, E. W. Thornewill, D. P. D. G. Kelly, L. R. Stewart (January 27).

Wing Cdr. E. H. Sparling, A.F.C., is placed on the retired list at his own request (February 19).

The following Flight Lieutenants are transferred to the Reserve Class A (February 21):—W. J. Brighty, J. R. Palmer, J. R. Watson.

F/O. R. P. H. Carew resigns his short service commission (February 13).

Medical Branch

The following Flight Lieutenant is promoted to the rank of Squadron Leader (February 15):—D. A. Wilson, M.R.C.S., L.R.C.P., D.M.R.E., D.M.R.

Errata

In the *Gazette* of February 9. *For* Eric William Tate *read* Erick William Tate. In the *Gazette* of February 16. *For* Flt. Lt. William John Kentfield *read* Flt. Lt. William George Kentfield.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

P. G. S. Gardiner is granted a commission as Flying Officer in Class C (February 9); Flt. Lt. R. S. Barbour is transferred from Class C to Class A (May 1, 1936); Flt. Lt. F. V. Beamish (R.A.F. retired) relinquishes his reserve commission on reinstatement on the Active List (January 27); F/O. G. D. Hoyland relinquishes his commission on completion of service (February 1); F/O. A. E. Betts relinquishes his commission on completion of service and is permitted to retain his rank (February 5).

The notifications appearing in the *Gazette* of the dates stated concerning the following Flying Officers are cancelled:—H. D. Morley (March 17, 1936); H. A. Yeo (August 11) 1936).

Medical Branch

Flt. Lt. J. B. Murphy, M.B., B.Ch., relinquishes his commission on completion of service (February 2).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—F/O. R. W. Burkitt relinquishes his commission on account of ill-health (February 24).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore.—E. W. Norton, D.S.C., to Headquarters, Coastal Command, Lee-on-the-Solent; for duty as Air Officer-in-Charge of Administration, 15.2.37.

Group Captain.—A. N. Gallehawk, A.F.C., to No. 5 Flying School, Sealand; to command, 15.2.37.

Wing Commander.—H. D. O'Neill, A.F.C., to Headquarters, R.A.F., Iraq, Hinaidi; for Air Staff duties, 11.2.37.

Squadron Leaders.—J. F. F. Pain, to No. 5 Flying Training School, Sealand; for flying duties in Advanced Training Squadron, 14.2.37. P. R. T. J. M. I. C. Chamberlayne, A.F.C., to Special Duty List, on appointment as Assistant Air Attaché, Paris, 7.2.37. V. Harris, to Headquarters, R.A.F., Iraq, Hinaidi; for duty as Air Liaison Officer, 11.2.37. F. T. Barrett, D.S.O., D.F.C., to No. 8 (Bomber) Squadron, Aden; to command, 11.2.37.

Flight Lieutenants.—G. E. Sampson, to R.A.F. Station, Kalafrana, Malta, 13.2.37. J. T. Mynors, to R.A.F. Station, Kenley, 11.2.37. H. J. Walker, to R.A.F. Station, Northolt, 15.2.37. J. V. Yonge, to No. 7 Flying Training School, Peterborough, 13.2.37. R. G. Bowditch, to Aircraft Depot, Karachi, India, 11.2.37. H. J. G. E. Proud, to No. 2 (Indian Wing) Station, Risalpur, India, 11.2.37. S. R. Ubee, to No. 60 (Bomber) Squadron, Kohat, India, 11.2.37. C. G. Skinner, to Aircraft Park, Lahore, India, 11.2.37. D. H. F. Barnett, to No. 84 (Bomber) Squadron, Shaibah, Iraq, 11.2.37. W. R. Beaman, to Headquarters, R.A.F., Iraq, Hinaidi, 11.2.37. G. Bearne, to Aircraft Depot, Hinaidi, Iraq, 11.2.37. D. I. Coote, to No 203 (Flying Boat) Squadron, Basrah, Iraq, 11.2.37. T. A. T. Stowell to No. 1 Armoured Car Company, Hinaidi, Iraq, 11.2.37. E. C. Lewis, to No. 2 Flying Training School, Digby, 5.2.37. J. G. G. Moore, to R.A.F. Station, Odiham (No. 50 (A.C.) Wing), 9.2.37. N. C. Pleasance, to No. 108 (B) Squadron, Upper Heyford, 8.2.37. J. C. Cunningham, to No. 34 (B) Squadron, Lympne, 10.2.37. P. W. M. Wright, to Headquarters, No. 1 (B) Group, Abingdon, 10.2.37. P. S. H. Ross, to No. 11 Flying Training School, Wittering, 18.1.37. F. J. Taylor, to No. 114 (B) Squadron, Wyton, 5.2.37.

Flying Officers.—J. B. Selby, to Aeroplane and Armament Experimental Establishment, Martlesham Heath, 9.2.37. O. H. D. Blomfield, to No. 74 (F) Squadron, Hornchurch, 9.2.37. R. B. Cleaver, to Air Armament School, Eastchurch, 14.2.37. V. W. Glasheen, to Air Observers School, North Coates Fitties, 15.2.37. D. F. Macdonald, to No. 9 (Bomber) Squadron, Scampton, 10.2.37. B. G. Morris, to No. 605 (Warwick) (Bomber) Squadron, Castle Bromwich, 12.2.37. S. T. Misselbrook, to No. 203 (Flying Boat) Squadron, Basrah, Iraq, 11.2.37.

Pilot Officers.—P. M. J. Evans, C. P. V. Hervey, to No. 20 (Army Co-operation) Squadron, Peshawar, India, 11.2.37. A. W. T. Traill, to No. 28 (Army Co-operation) Squadron, Ambala, India, 11.2.37. J. H. Grant, D. H. Holmes, to No. 31 (Army Co-operation) Squadron, Karachi, India, 11.2.37. W. O. L. Smith, to Aircraft Depot, Karachi, India, 11.2.37. O. J. M. Barron, J. H. Humphris, T. E. Shrapnell-Smith, to No. 22 (T.B.) Squadron, Donibristle, 8.2.37. W. H. Cliff, J. A. Richardson, D. B. M. Wright, to No. 22 (T.B.) Squadron, Donibristle, 8.2.37. G. Thomas, to No. 144 (B) Squadron, Wyton, 2.2.37. J. Barrett, to R.A.F. Station, Calshot, 8.2.37.

Acting Pilot Officers.—D. E. W. Adamson, D. L. P. Bagot-Gray, P. H. Baily, A. Bruce, T. P. A. Bradley, A. R. Buchanan-Wollaston, R. Coe, F. J. L. Duus, G. Hudson, J. N. A. Buckmaster, L. M. Barlow, L. G. Bowler, H. R. A. de Belleroche, H. G. F. Gaubert, G. P. Gibson, W. R. J. MacWhirter, F. W. Miller, E. B. Morse, A. L. Taylor, S. P. Woollatt, P. H. Buckley, R. H. Bullard-Davies, T. M. Bulloch, J. J. K. Fleetwood, J. R. Grice, H. A. Olivier, W. P. Perioli, H. O. Thwaite, C. F. L. Tulloch, R. W. Turner, and L. T. Wallis, to No. 6 Flying Training School, Netheravon, 6.2.37. D. H. Cross, to No. 223 (B) Squadron, Nairobi, 29.1.37. S. A. Ellaby, to No. 11 (Bomber) Squadron, Risalpur, India, 11.2.37. F. F. Lambert, to No. 27 (Bomber) Squadron, Kohat, India, 11.2.37.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —

VIRGIN COUNTRY: A Fox Moth operated by Air Travel, N.Z., Ltd., flying down the Westland coast. In the background are Mt Cook and Mt. Tasman, the highest mountains in New Zealand. Sqdn.-Ldr. T. D. Hewett is the pilot.

THE WEEK AT CROYDON

Passenger Study : Weather : Kites and Balloons : Transatlantic Comparisons

A GLANCE at last week's passenger lists shows a varied bag, including a titled columnist, two ambassadors, a skating expert and, of course, the odd boxer, film star and the like. For once there was no Royalty. Stewards, who naturally make a close study of air passengers, say that the motto "the higher the fewer" applies to passenger grouses. Royalty never grumbles; ex-Royalty seldom; ambassadors and diplomats not very often. And so on down the scale, until you come to the very wealthy, who grumble pretty fiercely, and the newly-rich who are often insufferable. Tips work out on the "richer the fewer" principle. [We did not know that air-line passengers were expected to tip.—ED.]

The week-end blizzard which snowed up Dartmoor so that people couldn't get out of their dwellings (causing considerable indignation at the local gaol), put shipping into a panic, and caused a railway company to mislay a train, interfered with the Paris air services, but left the northern route, via Amsterdam, free, and all services in that direction flew as usual on Sunday. Earlier in the week torrential and persistent rain, fit to drown the ground staff where they stood, was officially described (from a warm, dry office) as "intermittent"—whereupon one wet and shiny traffic hand was heard to remark, "Yus, intermittent between the blinking drops." Let us hope all this presages a decent spring and early summer, when, this year especially, the special charter firms hope to reap a rich harvest.

British Airways appear to be firmly settled at Croydon, and that international type of theirs, the German Ju.52 with the American motors and the Hamilton airscrews, is now running on the London-Hanover night mail service. The Croydon-Dublin service, by the way, has been operated with an Olley Air Service D.H.86, whilst Rollasons had *Erin*, the Irish Sea Airways D.H.86, in for C. of A. She is now out and about again. Capt. John Lock, one of the original Imperial 86 pilots, and previously with Hillmans, is back from the East on leave after a long spell between Karachi and Singapore on Atalanta class machines and on 86s between Penang and Hong-Kong. Imperial junior captains, known as "two and a half ringers," have been doing supernumerary flights lately on H.P.42s, and it is thought they may take these over when senior captains transfer to the A.W 27s.

Some nations resent our rearmament scheme, presumably on the grounds that their armament thrust is the only one with pure and peaceful motives. I trust there will be no outcry about our "airship" activities at Cardington, where all is apparently bustle and intense activity. A *Notice to Airmen* points out that kite balloons are actually being flown from there and—most sinister and secret fact—they are not fitted with the usual streamers and lights as specified in the Air Navigation (Consolidation) Order!

Redecoration

Considerable noise and disturbance in the main hall is being caused by the fact that K.L.M. are redecorating their passenger reception office. I hear that panelling, concealed lighting and mural paintings will replace the posters and oddments which hitherto made that office, together with most of the others, look more like a parcels depot in a back street. The idea expounded by the manager is that first-class travellers should have a first-class welcome.

Last week interest was aroused at Croydon by a visit from Mr. Chesney Stuart, London representative of the American T.W.A. It is always interesting to swap notions, and those managers whose firms employ hostesses were able to gather a lot of useful information, for T.W.A. has this service very highly organised and has had a long experience with such staff. American air hostesses really are part of the crew and have heavy responsibilities regarding passengers, their tickets and the actual make-up of the passenger manifest. One point shows how greatly ideas differ in different countries. An American hostess has her

name up on a board in the machine alongside those of the other members of the crew. She gets to know all the passengers' names, and a matey atmosphere, so dear to the transatlantic heart, is established. I cannot see it working here, since the average English passenger, when addressed by name (and expected to reciprocate) would go all "rigor mortis" for the whole journey. The main difference between European and American air-line mentality is best illustrated by the fact that smoking in machines is prohibited over here unless a special compartment exists, and alcoholic drinks are served, whereas, over there, smoking is encouraged even in fourteen-seaters, but the serving of any but soft drinks is almost universally frowned upon. There is also the passengers' seat-belt controversy. Here it exists, but only for emergency. There they are fastened for every take-off or landing. A. VIATOR.

France and the Atlantic

THE French Government is inviting tenders for the preliminary work connected with a North Atlantic service, for which half a million sterling has been voted in the budget.

As the group consisting of Air France and the Compagnie Generale Transatlantique has had this matter in hand for the past six months, it is realised that this action by the Government is purely a matter of form. The lure of £500,000 may induce other interests to tender, but it is regarded as inconceivable that there will be any other serious candidates.

Automaticity

DURING the past few months there have been various developments in the matter of the P.B. automatic pilot. Mr. Philip Bailey, the P.B. demonstration and test pilot, has been in both the U.S. and Czechoslovakia fitting up experimental layouts for test work, and one of these automatic pilots has, for some time, been in satisfactory use in an Imperial Airways' Avro 652 used by the school. Things move slowly, but they *do* move, and the P.B. may soon take its place in commercial aircraft.

No Surcharge in France

IN future there will be no surtax on letters to be carried by air within the limits of France. All letters will be delivered anywhere else in France within twenty-four hours. The Posts and Telegraphs service has the right to decide what is the best means of accomplishing this rapid delivery.

The special blue air mail boxes will no longer be seen in France. All mail will be posted in regular boxes and the postal services have complete authority to decide what is the most rapid method of delivery. The reorganised internal air services will carry the mail whenever a real saving in time is made possible.

The Minister of Posts and Telegraphs, M. Jardillier, hopes to conclude agreements with other governments which have no extra air mail charge.

Preparing for the Atlantic

ON February 25 the Short boat *Cambria* flew from Southampton to Foynes, in the Shannon Estuary, whence she was to carry out local flights to test the Rynanna radio station, and to check fuel consumption. She was in charge of Capt. G. J. Powell, assisted by the same crew which accompanied him on the round-England flight. Also on board were Commandant G. J. Carrol, of the I.F.S.A.F., and Mr. P. Candy of the Dublin Office of Works. *Cambria* returned again on Monday.

While in Ireland *Cambria* flew about 400 miles up and down the coast between Valentia and the Aran Islands. During that time they had been in constant touch with the radio stations at Foynes and Ballygireen (Rynanna), and had checked the bearings and positions given. The weather said Capt. Powell, had been bad throughout the trip, with rain and hail all the way.

Tremendous interest was taken in the flights and *Cambria* was inspected by an official party from Dublin. On her flight from Southampton she had on board as passengers, Mr. Maurice Banks, of the Air Ministry, Sqn.-Ldr. Turner, and, as given above, two representatives of the Free State Government.

There is trouble of a financial kind over the terminal on the other side. Work is, of course, well advanced at Botwood, Newfoundland, but the U.S. terminal has not been decided upon. New York proposes to establish a base at North Beach, Long Island, but a number of east coast towns are also in the running. It must be remembered that P.A.A. has not yet obtained the Atlantic mail contract. Meanwhile, it is reported in America that Mr. Plesman, the managing director of K.L.M., has criticised the attempt of I.A. and P.A.A. to obtain an Atlantic "monopoly." He is over there to negotiate the K.N.I.L.M. service extension to Manila.

Lockheeds in England

VERY shortly—if they are not already here—the first batch of the Lockheed Electras ordered by British Airways will be at Southampton, where, presumably, they will be erected at the airport. A Lockheed test pilot will accompany these four machines. The fifth will be delivered in June. Apart from the installation of Marconi radio equipment, the Electras are almost standard.

All-air

ON and after Saturday all the Empire air services will be operated from the temporary base at Hythe, and the five boats which are at present in action will carry passengers for Africa and the East to Alexandria on the four services in each direction.

Incoming services have been speeded up by half a day between England and Egypt, so that only one night's stop is necessary. On the previous schedule the second night was spent at Mâcon, on the Saône. *Castor* was the first boat to do the journey in two days.

When the boats are flying through to Singapore and beyond, the Indian and Burman bases will be in harbours, rivers and lakes at Karachi, Udaipur, Jhansi, Allahabad, Calcutta, Akyab, Rangoon, Mergui and Victoria Point.

University Navigation

THE fact that the Navigation Department of the University College of Southampton is, as already recorded in *Flight*, providing courses in air navigation is interesting primarily because no all-embracing educational centre has previously included this subject in its curriculum. The reasons for this lack of official interest are two: Air navigation has been considered as a specialised subject, and the number of prospective students has not been large enough to justify the organisation of special departments.

With the steady expansion in air transport, the second reason is likely to be less important year by year, and, in the case of the University College, the first reason can be ignored because this centre already has a department of navigation—and the differences between marine and air navigation are so small as to be negligible. Admittedly, the transport pilot is working in restricted surroundings and must, therefore, often do his navigation by short methods or with the help of the various available calculating instruments. But the First and Second Navigators' Licence examinations are not concerned so much with testing an applicant's ability to do the job in practice as with discovering whether this applicant has a sound understanding of the principles involved. Without this understanding, the ability to do quaint things with a C.D.C. can be a positive danger.

Nevertheless, Capt. E. Brook-Williams, the chief lecturer under Capt. G. W. Wakeford, the principal, has made it his business to do quite a lot of flying, both on Service machines and with Jersey Airways, in order that he may understand the essential difficulties and differences, and the exceptional results so far obtained in examinations gives the lie to any suggestion that the sea-going navigator is not in every way fitted to instruct air-going pupils. How many air navigation instructors are, or have been, professional pilots?

Since the department is one in an accredited educational centre, its pupils cannot be "crammed" His Majesty's inspectors see to that; they are interested in methods rather than in examination results.

Nor can the fees be high. The University Council would be very upset if any department actually made money—or even failed to lose enough. Few of those people who complain about education in general realise how much is spent thereon by taxpayers and philanthropists in this country. In fact, the fees for the air navigation courses are purely nominal—£2 8s. for First Class, £6 6s. for Second Class and £4 4s. for "B" licence examinations. Students can start at any time, and those doing a full-time course may board at South Hill, Bassett, Southampton, for a very small sum.

Commercial Aviation

New Rules

SEVERAL changes are to be made, on and after April 1, in the Air Navigation Directions, and these are given in the *Air Navigation (Amendment) Order*, 1937.

The chief amendment concerns the rules of lights and signals, but the order also refers to banner-towing and the like, dangerous flying, and the provision of effective electrical output for all flights.

An Australian Tragedy

AFTER a silence of nine days, the Stinson transport machine which left Brisbane for Sydney on February 19 was found on the Macpherson Range some sixty miles from the point of departure. Five of the seven occupants were found dead; the remaining two were not seriously hurt. One of the victims had been killed by a fall while searching for assistance.

Asking the Public

ONCE again North-Eastern Airways are asking their prospective clients for their ideas on the most useful arrangements before publishing their spring time-table. Only so is it possible for a pioneer air line company to gauge public support.

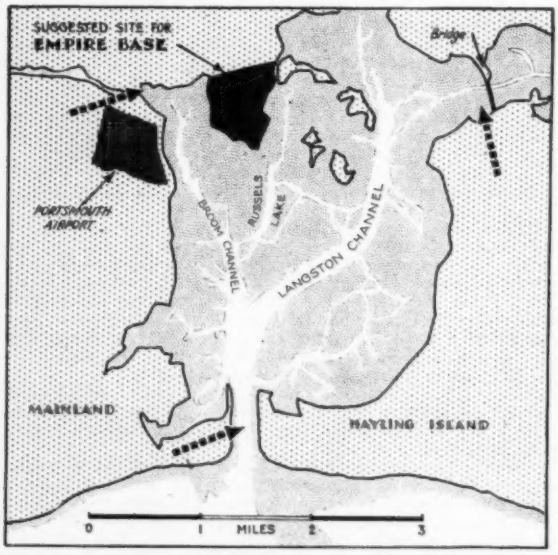
On April 5 the company's Croydon-Doncaster-Perth service will be duplicated and extended to Aberdeen. Mr. Boitel-Gill is the chief pilot of the company; he was previously flying on Wrightways' dawn service to Paris, so he should know all about it.

Barrage at Portsmouth

AS might have been hoped, the Portsmouth City Council has accepted the Committee's proposal that the Empire air base should be of the barrage type. The cost will be £1,221,452 (strangely detailed figure!), towards which the Government will contribute 50 per cent. up to a maximum of £600,000. It will also guarantee an annual income of £30,000 for the first fifteen years.

The acceptance, however, resulted in one of the largest protest meetings ever seen at Portsmouth. About 2,000 ratepayers assembled in the Guildhall to complain about the necessary increase in the rates—so we may not have heard the end of the matter after all.

It will be remembered that in its issue of April 16, 1936, *Flight* described and illustrated the Langstone Harbour area, when the scheme was rather less a project than a vague possibility.



BARRAGED: A sketch plan of Langstone Harbour with arrows to show the positions to be taken by the barrages, which will make the projected base tide-proof.

Where?

TWENTY Bellancas of unstated type have been ordered by the Hanover Import and Export Co., of New York, for foreign air-mail service.

A Jamaican Service

A NEW service has recently been started by Pan-American Airways to bring Miami within five hours of Kingston, Jamaica. The first service was inaugurated with an S.42 carrying nineteen passengers.

We Are Ready

UNDER the mysterious-to-the-uninitiated title of "QRV," a new firm has been started at Croydon by Mr. H. W. Hamblin, until recently chief radio expert of British Continental Airways. Since the firm is one of aircraft radio consultants, none but the uninitiated need to have the title problem solved for them; in fact, it is the "Q" code abbreviation for "Are you ready?" or "I am ready," and explains the whole business of the firm in three letters.

Apart from the excellent Marconi organisation, there has always been room for sound aircraft wireless consultants, and "QRV" is designed to fill the gap. In addition, the firm acts as a superior employment agency for operators with known and considerable marine or air experience. Mr. Hamblin himself, is, incidentally, shortly flying out to South Africa in one of the three Ju.86s which are shortly to be delivered. Both he and his assistant, Mr. L. N. Vaughan, have had a very wide experience, the former with a Service foundation, and the latter with a Marine foundation. Their hours run on well into the thousands.

Air France Summer

COMING into force on April 4, various changes have been made in the Air France time-table.

An arrangement has been made with Railway Air Services by which passengers from Glasgow, Liverpool and the Midlands will be able to reach or return from points such as Marseilles and Zurich in a single day's travelling.

A new direct service from London to Geneva will be started, leaving at 4 p.m. and arriving at 7.45 p.m. To cope with Coronation traffic there will be five London-Paris services daily in each direction. Further, a new service is to be opened from Paris, via Bordeaux, to Toulouse, to take the place of the night railway link previously used. Thus, air travellers to the Gold Coast and Nigeria (by the new weekly service, via Dakar, which started on March 1) will do the whole journey by air.

Two days have been saved by the introduction of Potez machines on to the Damascus-Hanoi section of the Far Eastern line. At Hanoi connection will be made with the C.N.A.C. service.

An Irish Company

A GOVERNMENT-SPONSORED air transport company is to be established in the Irish Free State. A supplementary estimate of £2,500 as preliminary expenses for the establishment of the company was moved in the Dail recently by Mr. Sean Lemass, Minister for Industry and Commerce.

He stated that the policy of the Government with regard to civil aviation envisaged the establishment of a national aviation company to operate all internal air transport services, to represent the Free State in international air services with other countries, and to act as the Free State's nominee on the joint-operating company responsible for the Transatlantic air service. Air connections at Free State ports to serve Transatlantic shipping would also be provided. The Minister of Finance would acquire shares in the national company to the total value of the share capital, and would guarantee any debentures issued by that company.

The national company would hold 24½ per cent. of the stock of the joint-operating company, the capital of which would be approximately £1,000,000, and would also be responsible for the payment of 5 per cent. of the annual subsidy to the service, subject to a maximum of £12,000 a year.

Irish Sea services would be operated by a subsidiary company, and, in addition to the regular service between Dublin and London, via Bristol, at present carried by a temporary company, new services would be established connecting Dublin with the Isle of Man and Liverpool, between Dublin, Belfast and Scotland, and between Cork and Wales and the South of England.

MODELS

Competition News

By M. R. KNIGHT

Another Interesting Machine Described

A Successful "Semi-scale"

IT is an unfortunate fact that the flying performance of a rubber-driven model aeroplane tends to deteriorate as "true-scale" appearance and proportions are approached. This is due to the effect on design of the absence of a pilot, the varying power output of the rubber, and the weight of the rubber motor being distributed along the fuselage.

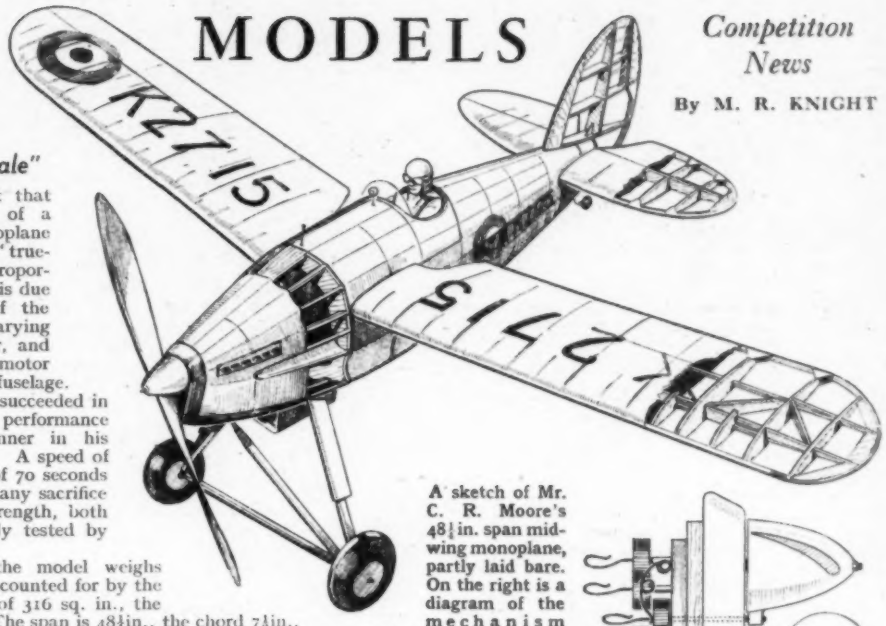
Mr. C. Rupert Moore has succeeded in combining appearance and performance in a truly remarkable manner in his *Viper II* Intercepter fighter. A speed of 18 m.p.h., and a duration of 70 seconds have been achieved without any sacrifice of stability or structural strength, both of which have been severely tested by continuous bad weather.

Built largely of balsa, the model weighs 20 oz., of which 5.8 oz. is accounted for by the rubber. With a wing area of 316 sq. in., the loading is 9.09 oz./sq. ft. The span is 48¼in., the chord 7½in., and the overall length 33in. There are 5 degrees of dihedral, 4.5 of sweepback, and 3 of incidence. Four skeins, each of five strands of ⅛in. × 1/20in. rubber, drive the satin-walnut airscrew, the diameter and pitch of which are 15in. The thrust-line is offset to the right 2 degrees, and there are also 2 degrees of down-thrust.

The wing is built in two parts, connected by bamboo pegs to a frame, which passes beneath a removable section of decking, and is held by rubber strip to anchorages within the fuselage. The method employed allows for a small variation in longitudinal trim, and imparts a certain degree of flexibility. The main spar consists of two lengths of ⅛in. × ¼in. hard balsa, spaced ¼in. apart, and reinforced with $\frac{1}{32}$in. balsa sheet between the ribs in such a manner as to constitute a box-spar for a third of the span, and U-section for a further third. A T-spar is used for the leading edge, and a triangular length for the trailing edge, both balsa, while the curved tip is formed from $\frac{1}{16}$in. × $\frac{1}{16}$in. birch, reinforced with balsa. There is diagonal bracing of thin wood between the spars. Medium balsa is used for the ribs. Dihedral and sweepback are built into the centre-section frame.

The fuselage varies from orthodox practice in having two shaped "spines" of hard balsa running the entire length, top and bottom. Between these are fitted bulkheads of 1 mm. birch three-ply, carrying numerous stringers to secure the external shape. The radiator and exhaust ports are formed from thin balsa sheet, and the nosepiece from ⅛in. plywood, faced with whitewood and balsa. The final touch of realism is imparted by the presence of "Flt. Lt. Balsa," a most realistic-looking pilot, who, unlike most carved effigies, really does add to the appearance of the model.

The compression legs of the undercarriage are brown paper tubes, front and rear legs and axle are of bamboo, and the wheels are laminated newspaper! A two-ply balsa tail-wheel is fitted. The tail-plane consists of a single reinforced spar of ⅛in. balsa, $\frac{1}{16}$in. balsa ribs, and $\frac{1}{16}$in. × $\frac{1}{16}$in. birch edging. Rudder and fin are built similarly, with a $\frac{1}{32}$in. balsa sheet over the leading edge, and a trimmer tab of ⅛in. balsa, hinged with aluminium sheet. Jap silk is used for covering the fuselage, and bamboo tissue for wings and tail unit.



A sketch of Mr. C. R. Moore's 48¼in. span mid-wing monoplane, partly laid bare. On the right is a diagram of the mechanism which stops the airscrew in a horizontal position to avoid risk of damage on landing. As the rubber tension relaxes, a small spring pushes one gear shaft forward to act as a stop against the spinner

Each year's winner of the *Flight* Challenge Trophy for scale models at the Northern Heights Club's gala day receives a plaque, as shown here, to keep as a "replica." This year's event occurs on June 20.

First 1937 Competition

THE 1937 outdoor season opens on April 9 with the contest for the Gamage Cup, which will be held simultaneously on the grounds of clubs affiliated to the S.M.A.E. It is the only event where any type of rubber-driven model may be entered, and until comparatively recently was responsible for an annual muster of venerable twin-pusher "spars," one of which invariably won. Eventually the lightness of balsa brought victory to the fuselage type. Nowadays the best average of three rise-off-ground flights wins the Cup.

An Indoor Record

ON January 22 at the Albert Hall, London, Mr. R. Copland, of the Northern Heights M.F.C., who secured third place in the 1936 Wakefield Contest, raised the British Indoor Spar Duration Record to 18 min. 52 sec. Visitors who have previously encountered only outdoor models are amazed at the delicacy and lightness of these indoor craft which, with a wing-span of about 22in., weigh one-sixth of an ounce! The pear-drop-section motor spar is made by rolling a strip of $\frac{1}{32}$in. balsa sheet around a knitting-needle, while the tail outrigger, which projects from the rear of the motor spar, is similarly constructed from 1/64in. sheet. Wing, tail, and sometimes even the airscrew, are covered with "microfilm," which is formed by pouring collodion, amyl-acetate and castor oil, or some alternative solution, on the surface of warm water, from which it is removed with a wire hoop.

1937 Wakefield Designs Hatching!

IT is already apparent that opinions are somewhat diversified as to the best application of the new Wakefield Cup rules. The minimum weight, it will be recalled, is now 8 oz. instead of 4, while the wing area must still be 200 sq. in., but with a plus as well as a minus tolerance of 10 sq. in. (not 10 per cent.,

as inadvertently stated last month). One school of thought favours a model little different from last year, the additional stipulated weight being represented by a greater quantity of rubber. This, of course, involves the use of gearing, which had largely fallen into abeyance. Multiple gearing, with the airscrew driven off an idling shaft, has the great advantage of permitting perfect thrust-line placing for the high-wing monoplane (which seems the logical lay-out for this class), without the rubber fouling the top of the fuselage. It is also extremely helpful in securing a low c.g. This interpretation of the new weight rule seems an entirely justifiable one, and has the merit that balsa must be used in a knowledgeable way to withstand the terrific strain imposed by the rubber motor.

On the other hand, sundry designers are breaking away from the old orthodoxy, and relying on the prolonged glide to be obtained from sound streamlining allied to suitable wing-sections. News is to hand of several interesting and sound schemes, including two low-wing monoplanes with monocoque fuselage, a cabin high-wing, and a mid-wing with retractable undercarriage and airscrew blades! One designer is pinning such faith to the value of efficient streamlining in improving the glide as to dispense with gearing. Even at the lowest estimate some progress should result from the higher airspeed involved in the new rules.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

GIRO AIRCRAFT MANUFACTURING CO., LTD. Private company, registered January 29. Capital £1,000 in 20,000 shares of 1/- each. Objects: To carry on the business of manufacturers of and dealers in and repairers of aerial conveyances and the component parts thereof, etc. The subscribers are: Eugene M. G. Lepère, 180, Sloane Street, London, S.W.1, aeronautical engineer; Patrick H. Edwards, 33, Southampton Street, London, W.C., solicitor. The first directors are not named. Solicitors: Harrington, Noble & Co., 376, Strand, London, W.C.2.

SOUNDPROOFING LTD. Private company, registered February 3. Capital, £2,000 in 2,000 ordinary shares of £1. Objects: To carry on the business of manufacturers and letters on hire of equipment and apparatus for acoustical purposes, etc. Power is also taken to carry on business as electrical, mechanical, aeronautical, automobile, acoustical and general engineers, etc. The directors are: Major The Hon. Wm. S. P. Alexander, D.S.O. (director of Abbey Coachworks, Ltd.); Capt. Alan A. Curry (director of Abbey Coachworks, Ltd.). Registered office: Minerva Road, Chase Estate, Park Royal, N.W.10.

AEROTECHNIC DEVELOPMENTS LTD. was registered as a public company on January 29, with a nominal capital of £100 in 100 shares of £1. The objects are to acquire patents, concessions, etc., and to carry on the business of engineers, founders, smiths, machinists, manufacturers and patentees, etc. The directors are: Robert Hunter, 43, Newquay Road, Catford, London, S.E.6; Alfred W. Rawlinson, 5, Ridings Avenue, Grange Park, Mdx.

G. W. S. BURDETT & CO., LTD. (323,918).—Private company, registered February 5. Capital, £5,000 in 5,000 shares of £1 each. Objects: to acquire the business of a machine tool manufacturer and general engineer carried on by G. W. S. Burdett, at Eastgate, Peterborough, and to manufacture and deal in automobile and aircraft components, etc. The permanent directors are:—George W. S. Burdett, 35, Fletton Avenue, Peterborough, engr. (chairman); Mrs. Beatrice M. Burdett, 35, Fletton Avenue, Peterborough.

AEROMARINE ASSOCIATES, LTD.—Private company. Registered January 11. Capital, £100 in 100 shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in all kinds of aircraft, etc. The first directors are to be appointed by the subscribers. Solicitors: McKenna and Co., 31/4, Basinghall Street, London, E.C.2

L.H.G. LTD.—Private company, registered January 18. Capital, £100 in 100 shares of £1. Objects: to carry on the business of carriers of passengers, goods and mails in aeroplanes, etc. The subscribers are: Lillian H. Gibbs, 3, Shepherd House, Shepherd Market, London, W.1, company secretary; Gerald A. Glover, 115, Park Street, Park Lane, London, W.1, solicitor. The first directors are to be appointed by the subscribers.

M. AND W. AIRCRAFT, LTD.—Private company. Registered January 18. Capital, £100 in 2,000 ordinary shares of 1s. each. Objects: to carry on business as aeronautical engineers, experts and consultants, etc. The subscribers are: Dorothy Wilson, 119, Queen's Road, London, W.2, company director; Charles H. C. Bromfield, 42, Kensington Park Gardens, W.11 salesman.

ST. MERRYN AERODROME, LTD.—Private company. Registered January 14. Capital, £3,000 in 3,000 shares of £1 each. Objects: To acquire, build and maintain aerodromes, etc., and to carry on the business of aeronautical experts and consultants, aeroplane manufacturers, air transport contractors, etc. The directors are: Henry B. Legge, Philip H. B. Legge, Geoffrey B. Legge and William H. Rhodes-Moorhouse. Registered office: 81, Cannon Street, E.C.4.

NUFFIELD MECHANIZATIONS, LTD., was registered as a private company on January 22 with a nominal capital of £250,000 in 250,000 shares of £1 each. The objects are to carry on the business of manufacturers of and dealers in armaments of all kinds for use by land, sea or air, and in particular armoured tanks, cars, lorries, and vehicles, vessels and craft of every description. The first directors are Lord Nuffield, Oliver Boden, Wilfred Hobbs and Andrew Walsh.

AIRCRAFT ENGINEERS, LTD.—Private company. Registered February 20. Capital, £1,000 in 1,000 shares of £1 each. Objects: To carry on business as aircraft, precision tool and template engineers, etc. The permanent directors are: Herbert Sandiford, The Mount, Virginia Water, Surrey, engineer; Leslie H. Sandiford, Chichester House, Richings Park, Iver, Bucks, engineer.

AERO-MARINE ENGINES, LTD. (as recorded in *Flight* last week) was registered as a private company on February 12, with a nominal capital of £70,000 in 280,000 ordinary shares of 5s. The objects are to carry on the business of manufacturers of and dealers in aircraft, marine craft, aero and marine engines, and accessories of all types, etc. The first directors are to be appointed by the subscribers. Solicitors: Clifford-Turner & Co., 11, Old Jewry, London, E.C.2.

BRITISH WIREDRAWERS, LTD.—Private company, registered February 24. Capital, £100 in 100 ordinary shares of £1 each. Objects: to carry on the business of wire-rod rollers, manufacturers and drawers of wire and special sections of round or other shape for cables of all kinds, aeronautical requirements, etc. The directors are:—Percy L. Hunting, shipowner; Gerald L. Hunting, shipowner; Donald E. Grant engineer. Registered office: "B" Floor, Milburn House, Newcastle-on-Tyne.

INCREASES OF CAPITAL

SAUNDERS-ROE, LTD., East Cowes, I.O.W.—The nominal capital has been increased by the addition of £162,000 in £1 shares, beyond the registered capital of £162,000. The 120,000 ordinary shares of 2s. each have been converted into 12,000 shares of £1 and together with the 150,000 participating preferred ordinary shares have been converted into 162,000 ordinary shares of £1.

G. Q. PARACHUTE COMPANY, LTD., 17, Stoke Road, Guildford. — The nominal capital has been increased by the addition of £8,000 in £1 ordinary shares beyond the registered capital of £2,000.

BRITISH AERO COMPONENTS, LTD. (Holbrook Lane, Coventry.).—The nominal capital has been increased by the addition of £5,000 in £1 ordinary shares, beyond the registered capital of £15,000.

AIRCRAFTINGS, LTD. (34, Highgate Square, Birmingham).—The nominal capital has been increased by the addition of £2,900 in £1 ordinary shares beyond the registered capital of £100.

BRITISH AIRWAYS, LTD. (Terminal House, Grosvenor Gardens, London, S.W.1).—The nominal capital has been increased by the addition of £65,000 beyond the registered capital of £300,000. The additional capital is divided into 62,804 "D" ordinary and 1,796 ordinary shares of £1.

The 63,204 "D" ordinary shares are to be issued to British Continental Airways, Ltd., or their nominees as consideration for the acquisition of assets of that company.

THANET AERO CLUB, LTD., PLYMOUTH AND DISTRICT AERO CLUB, LTD., AND IPSWICH AERO CLUB, LTD.—In the case of each of these three clubs, all of which are under the control of Whitney W. Straight (Brettenham House, Strand, London, W.C.2), the nominal capital of £100 has been increased by a sum of £1,900, divided into 190 shares of £10 each.

PUBLICATIONS RECEIVED

The Air Annual of the British Empire, 1937. *Foreign Supplement*. Free to purchasers of the *Air Annual*; additional copies price 2s. 6d. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway, London, W.C.2.

Boys' Book of Flying, by Charles Boff, price 6s. Geo. Routledge and Sons Ltd., Broadway House, Carter Lane, London, E.C.4.

Airplane and Engine Maintenance for the Airplane Mechanic, by D. J. Brimm and H. E. Boggess, price 7s. 6d. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway, London, W.C.2.

Aeronautical Research Committee Reports and Memoranda:

No. 1687: Performance and Longitudinal Stability of a Single-Engined High-Wing Monoplane, by L. W. Bryant, D. H. Williams and A. F. Brown, price 3s. 6d. No. 1691: Comparison of Drag of Trousered and Retractable Undercarriages, by R. Jones, A. H. Bell and A. F. Brown, 1s. No. 1701: The Effect of Central Cutaway in Split Flaps on the Trim of a Low-Wing Monoplane, by D. W. Bottle, C. Calleo and K. W. Kirkby, 3s. No. 1704: Structure of Turbulence in a Natural Wind, with a Description of a Sensitive Pressure Gauge, by A. Graham, 2s. 6d.

No. 1707: Trailing-Edge Flaps in Relation to Take-off and Landing of Landplanes, by S. B. Gates, 4s. 6d. No. 1711: A Successive Approximation Process for Solving Simultaneous Linear Equations, by J. Morris, 2s. No. 1712: Full-Scale and Model Porpoising Tests of the Singapore IIc, by G. W. A. Perring and J. L. Hutchinson, 3s. 6d. No. 1713: Full-Scale Tests of Slots and Flaps on a Heinkel He.64 with Special Reference to Landing by J. E. Serby and H. B. Square, 2s. 6d.

No. 1718: The use of Dynamically Similar Models for Determining the Porpoising Characteristics of Seaplanes, by L. P. Coombes, W. G. A. Perring and L. Johnston, 2s. 6d.

No. 1719: Full-Scale Tests of the Hendy Heck, by A. E. Woodward Nutt and P. A. Hufton, 3s. No. 1722: The Effect of a Reduction and Aileron Torsional Stiffness on the Flutter of a Model Wing, by V. M. Falkner, W. P. Jones and C. Scruton, 1s. 3d. No. 1706: Tests of Six Aerofoil Sections at Various Reynolds Numbers in the Compressed Air Tunnel, by E. F. Relf, R. Jones and A. H. Bell, 4s. 6d.

No. 1708: Effect of Surface Roughness on Characteristics of Aerofoils N.A.C.A. 0012 and R.A.F. 34, by R. Jones and D. H. Williams, 8s. No. 1709: Experiments on a Heinkel He.70 Aeroplane in the Compressed Air Tunnel, by R. Jones and E. Smyth, 1s. No. 1716: Oscillations of Elastic Blades and Wings in an Airstream, by W. J. Duncan, A. R. Collar, and H. M. Lyon, 6s. 6d. No. 1717: Tests of Aerofoils R.A.F.69 and R.A.F.89, with and without Split Flaps in the Compressed Air Tunnel, by D. H. Williams, A. F. Brown and E. Smyth, 3s. 6d. All from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

(Published February 18, 1937).

20201. PARAVICINI, T. P. DE.: Gearing for airscrews (460,149).
21072. SMITH, J. W.: Method of fabricating an aeronautical propellor blade and the like (460,237).
21100. RAWLINGS, A. L.: Gyroscopic compasses (460,244).
12244. CESKOSLOVENSKA ZBROJOVKA AKCIOVA SPOLECNOST BRNO.: Aircraft gun mountings and the like (460,169).
14420. POPELAKOVA, M.: Parachutes (460,114).
20578. SPERRY GYROSCOPE CO., Inc.: Sound locator horn for aircraft locating systems (460,267).

(Published February 25, 1937).

21761. KAY GYROPLANES, LTD., KAY, D., and DYER, J. W.: Aircraft (460,634).
21810. GRAY, W. E.: Aeroplane stabilising means (460,636).
28234. DOWTY, G. H.: Undercarriages for aircraft (460,316).
28675. BOXOMI, V.: Aircraft (460,318).
32942. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and MANSELL, S. W.: Fuel injection pumps for internal combustion engines (460,327).
43209. SOC. ANON. ALFA ROMEO: Airscrews (460,332).
11941. WEICHARDT, R.: Apparatus for the starting and landing of aircraft on water (460,553).
29341. FAIREY, C. R.: Blades for airscrews and the like (460,513).
29725. BARKER, G. G. (Bendix Aviation Corporation): Shock absorbers (460,560).

(Published March 4, 1937.)

13282. ELLIS, D. L.: Servo mechanisms for the actuation of the control surfaces of aeroplanes (460,841).
16025. ATCHERLEY, R. L. R.: Method and means for effecting transfer of fuel, containers, persons, or the like from one aircraft to another during flight (460,843).
18987. CRUICHLEY, W. G. G.: Cellular airscrews and the like (460,767).
22311. JUNKERS MOTORENBAU GES.: Screw propellers for driving aircraft and watercraft (460,912).
22340. BAYNES, L. E.: Aircraft engines (460,975).
29590. BENDIX AVIATION CORPORATION.: Brakes (460,674).
31059. BRISTOL AEROPLANE CO., LTD., and FEDDEN, A. H. R.: Air intakes for internal combustion engines for aircraft (460,802).